

Harlequin Duck Surveys in Western Montana: 1993

A Report to:

USDA Forest Service

Kootenai National Forest
506 U.S. Highway 2 West
Libby, MT 59923

Submitted by

JAMES D. REICHEL
and
DAVID L. GENTER

October 1994

Montana Natural Heritage Program
1515 East Sixth Avenue
P.O. Box 201800
Helena, MT 59620-1800

ABSTRACT

Breeding pair surveys for Harlequin Ducks were done on 409 km of 20 streams during May and June, 1993; a total of 42 Harlequins (27 males, 15 females) were seen on 6 streams. Brood surveys were done on 377 km of 21 streams during July and August, 1993; a total of 78 Harlequins (19 females, 59 young in 21 broods) were seen on 9 streams. Harlequins were reported on an additional 4 streams. Reproductive success, on streams surveyed both for pairs and broods, averaged 0.40 broods per female. Success in the North Fork Flathead drainage was substantially lower (0.32 broods per female) than in the lower Clark Fork drainage (0.60 broods per female). Brood size at or near fledging (Class III) averaged 2.86; August brood sizes were consistent among all drainages. No new breeding streams were confirmed in 1993. No birds were seen during pair (May) or brood (August) surveys of Sullivan Creek, which had Harlequins in 1992.

We continued banding Harlequin Ducks in the Flathead and Clark Fork drainages. Sixty-eight Harlequins (13 adult males, 14 adult females, and 41 juveniles) were marked on 7 streams. This brings the total number of Harlequin Ducks banded in Montana since 1991 to 159 (22 adult males, 34 adult females, and 103 juveniles). We observed 20 previously marked birds on streams. The banding program, while small in scale for waterfowl, is providing a significant tool for local monitoring and identifying coastal areas where Montana breeding birds molt and winter.

Six movements detected in 1993 were interesting. A male marked on McDonald Creek, Glacier National Park, on 6 May 1993, was captured on Hornby Island, along the east coast of Vancouver Island, British Columbia on 5 August 1993. This was the first record of a bird marked in Montana being relocated on the coast. On 14-15 March 1994 three Harlequins were observed

on Hornby Island, all marked as juveniles in 1992-3 on McDonald Creek. Local movements of birds, heretofore undocumented, include two marked females found on different streams in 1993 than where they were originally marked in 1992. Stream mouths were separated by 6 and 17 km respectively, across a reservoir and lake.

ACKNOWLEDGEMENTS

We thank Bob Summerfield for his help throughout the study. We were assisted with field work by Stan Beckstrom and Chad Castren. Additional help, location of possible trapping sites, and other logistical support was provided by J. Ashley, J. Davies, R. Galloway, S. Gniadek, C.E. Hidy, T. Hidy, W. Johnson, B. Kennedy, E. Pfalzer, H. Rivera, D. Roemer, N. Warren, and other Forest Service and Park Service personnel. M. Beer, C. Jones and C. Craig assisted with element occurrence and map preparation. Financial support for the project came from the Kootenai National Forest (U.S. Forest Service, Northern Region) and the Montana Natural Heritage Program (Montana State Library and The Nature Conservancy).

TABLE OF CONTENTS

ABSTRACT	iii
ACKNOWLEDGEMENTS	v
TABLES	vii
FIGURES	vii
INTRODUCTION	1
METHODS AND MATERIALS	3
RESULTS AND DISCUSSION	4
Surveys	4
Kootenai National Forest	4
Flathead National Forest	4
Custer, Gallatin, Kaniksu, and Lolo National Forests	5
Glacier National Park	5
Breeding Chronology	5
Reproduction	13
Capture and Marking	14
Relocation and marking effects	14
Movements	14
MANAGEMENT RECOMMENDATIONS AND RESEARCH NEEDS	24
LITERATURE CITED	26
APPENDICES	
Appendix A. Data forms	29
Appendix B. List of Harlequin Ducks marked in 1993	
or marked in previous years and sighted in 1993.	32
MARTEN CREEK, KOOTENAI NATIONAL FOREST	33
SWAMP CREEK, KOOTENAI NATIONAL FOREST	37
VERMILLION RIVER, KOOTENAI NATIONAL FOREST	39
ROCK CREEK, KOOTENAI NATIONAL FOREST	43
TRAIL CREEK, FLATHEAD NATIONAL FOREST	46
SPOTTED BEAR RIVER, FLATHEAD NATIONAL FOREST	49
GLACIER NATIONAL PARK	51

Appendix C. Element Occurrence Records from 1993 Surveys	
BOULDER RIVER	55
UPPER MCDONALD CREEK	57
ROCK CREEK (NOXON)	59
MARTEN CREEK	63
VERMILION RIVER	71
SWAMP CREEK	77
MIDDLE FORK FLATHEAD RIVER	81
TRAIL CREEK	83
SPOTTED BEAR RIVER	87

TABLES

Table 1. Streams surveyed for Harlequin Ducks in 1993	8
Table 2. Miscellaneous reports of Harlequin Ducks during 1993 and reports for prior years received during 1993.	11
Table 3. Harlequin Duck reproduction in 1993 for streams with both pair and brood (at fledging) information.	18
Table 4. Harlequin Duck reproductive parameters 1988-1993	19
Table 5. Summary of Harlequin Ducks marked in 1993	20
Table 6. Sightings and recaptures in Montana of adult Harlequins marked in Montana 1991-1992 and adult females marked in spring 1993.	21

FIGURES

Figure 1. Harlequin Duck breeding locations in Montana.	7
Figure 2. Hydrograph: 1988-1990 for the North Fork Flathead River near Columbia Falls, Montana	16
Figure 3. Hydrograph: 1991-1993 for the North Fork Flathead River near Columbia Falls, Montana	17

INTRODUCTION

The Harlequin Duck (*Histrionicus histrionicus*) is a small sea duck, which travels inland to breed on fresh water streams. The male is strikingly colored with black and white spots and crescents, and chestnut sides on a deep cobalt blue background. The female is dull brown with three white spots on the face. Harlequins breed in western North America from Alaska and the Yukon south through western Montana to California (Cassirer et al. 1993); in eastern North America they breed from Baffin Island south to eastern Quebec and Labrador (Goudie 1993). In the Palaearctic they breed in Iceland, Greenland and Siberia (A.O.U. 1983). Approximately 110 pairs of Harlequins currently breed in Montana (Genter 1993), with most located in the following areas: 1) tributaries of the lower Clark Fork River; 2) tributaries of the North, Middle, and South Forks of the Flathead River; 3) streams coming off the east front of the Rocky Mountains; and 4) the Boulder River (Miller 1988, 1989, Kerr 1989, Carlson 1990, Fairman and Miller 1990, Diamond and Finnegan 1992, 1993).

During the breeding season Harlequins are found along fast mountain streams (Bengston 1966). In many areas Harlequins use streams with dense timber or shrubs on the banks (Cassirer and Groves 1990), but they are also found in relatively open streams along the east slopes of the Rocky Mountains, Montana (Markum and Genter 1990, Diamond and Finnegan 1992) and the Arctic tundra (Bengston 1972). In Idaho, 90% of observations occurred near old growth or mature timber stands (Cassirer and Groves 1990). Mid-stream rocks, logs, islands, or stream-side gravel bars serve as safe loafing sites and appear to be important habitat components.

Most of the ducks arrive on their inland breeding areas in mid-April to early-May; unmated males typically arrive before pairs (Kuchel 1977). The males return to the coast shortly after the females begin incubation; most are gone by early July (Kuchel 1977). The females and

young remain on the streams until August or early September. This chronology is influenced by elevation and the timing of spring runoff and may vary up to several weeks between years.

The U.S. Forest Service, Region 1, lists the Harlequin Duck as Sensitive (Reel et al. 1989). The species is listed as a Species of Special Concern by the Montana (Genter 1992) and Idaho (Moseley and Groves 1990) Natural Heritage Programs. The eastern North American population is listed as endangered in Canada (Goudie 1993); both eastern and western populations are listed under Category 2 as a candidate for listing under the Endangered Species Act by the U.S. Fish and Wildlife Service (U.S. Department of Interior 1991).

The Montana Natural Heritage Program began surveying Harlequin Ducks in 1988. The survey data gave rise to questions involving site fidelity, productivity and mortality. Individual marking of birds began to a limited extent in 1991 and in 1992 a total of 85 Harlequins were marked on 5 streams. Long term goals include: 1) developing a baseline status report of current and historic Harlequin populations in Montana; 2) gathering information on site fidelity, reproduction and mortality to allow estimations of what constitutes viable Harlequin populations; 3) developing surveying protocols for actual and potential Harlequin streams; 4) developing management guidelines for maintaining and restoring Harlequin populations and habitat; and 5) identify coastal areas where Harlequins from the Northern Rockies occur. Goals for 1993 included: 1) surveying additional streams for presence and status of Harlequins; 2) gathering productivity data on some primary Harlequin streams; and 3) marking as many individuals as possible on selected streams for long-term monitoring.

METHODS AND MATERIALS

Harlequin Ducks were surveyed on parts of the Kootenai, Custer, Flathead, Gallatin, Kaniksu, and Lolo National Forests during May-August 1993. We also marked birds in Glacier National Park; surveys there were conducted primarily by Park Service personnel (John Ashley). Most surveys were conducted by walking the stream channel (when possible) or stream bank. In most cases the surveyor walked upstream, giving more time to observe the bird before it moved out of sight. Some large streams were surveyed by kayak. Dates, locations, km surveyed, and general characteristics of the stream reaches surveyed were recorded; any Harlequins sighted were noted with location, numbers, ages, and sex of birds present. For streams in the Flathead and Clark Fork drainages, we attempted to capture and mark all birds seen, when a licensed, qualified birdbander was present on the survey (Reichel or Genter). Captured birds were identified to sex and age, weighed, measured (wing cord and tail), marked, and released. Except in Glacier National Park, almost all birds were marked with numbered USFWS aluminum leg bands and colored nasal discs, individually recognizable by shape and color combinations (see Appendix B). Birds in Glacier National Park were banded with a USFWS aluminum band and a unique combination of 3 plastic, colored leg bands.

RESULTS AND DISCUSSION

Surveys

Kootenai National Forest. Pair surveys were conducted along 210 km of 9 streams during May-June 1993 (Table 1). A minimum of 20 Harlequins (11 males, 9 females) were seen on 3 streams (Appendix B & C). These included the Vermillion River (3 pairs), Swamp Creek (1 pair) and Marten Creek (5 pairs plus 2♂).

Brood surveys were conducted along 65 km of 4 streams during late July - August 1993 (Table 1). A minimum of 28 different Harlequin Ducks were observed on 3 streams (Table 1, Appendix B & C). Marten Creek had 2♀ present with 2 broods (4,4). Swamp Creek had 1♀ present with a single chick. Rock Creek had 1♀ present with a brood of 4 and 2 additional chicks were present from another brood (the female was not present). The Vermilion River had 2♀ present with 2 broods (4,4) and an additional single chick was present from another brood (the female was not present).

No Harlequins were observed on Elk Creek during our short survey, but a male was seen by F.S. personnel (Table 2).

Flathead National Forest. Pair surveys were conducted along 88 km of 6 streams during May-June 1993 (Table 1). A minimum of 16 Harlequins (10 males, 6 females) were seen on 2 streams (Table 1, Appendix B & C). These included Big Creek (1♂) and Trail Creek (5 pairs and 3♂); additionally we had a report of Harlequins from Whale Creek (Table 2).

Brood surveys were conducted along 185 km of 11 streams during July - August 1993 (Table 1). A minimum of 26 different Harlequin Ducks were observed on 3 streams (Table 1, Appendix B & C). These included: 1) Middle Fork of the Flathead River (3♀, 3 broods of 1, 3,

and 4 young), 2) Spotted Bear River (1 ♀, 1 brood of 4 young), and 3) Trail Creek (2 ♀, 2 broods of 3 & 5 young). No Harlequins were observed on Sullivan Creek where they were observed in 1992.

Custer, Gallatin, Kaniksu, and Lolo National Forests. Pair surveys were conducted along 111 km of 5 streams during May-June 1993 (Table 1). A minimum of 6 Harlequins (6 males) were seen during surveys on 1 stream, the Boulder River in Gallatin NF (Table 1, Appendix B & C). Additionally we had reports of Harlequins from Rattlesnake Creek (pair in 1990: Joe Ball; pair 1989, 1990, 1991).

Brood surveys were conducted along 127 km of 6 streams during July and August 1993 (Table 1). Two different Harlequin Ducks were observed on 1 stream (Table 1, Appendix B & C). The Boulder River had 1 adult female and 1 juvenile present. No Harlequins were observed during surveys of Trout Creek or the North Fork of the Blackfoot River (Lolo NF) where they have been observed in at least one of the past five years.

Glacier National Park. Brood surveys were conducted along 29 km of the McDonald Creek drainage on 10-11 August 1993 (Table 1). A minimum of 22 different Harlequin Ducks (6 ♀; 6 broods of 1, 2, 2, 3, 4, 4) were observed on McDonald Creek (Table 1, Appendix B & C). Many other surveys were conducted throughout the season by Glacier National Park personnel (Ashley 1993). These surveys found up to 18 adult females present in May.

Breeding Chronology. Breeding was early again this year, probably due to rapid spring runoff in early May. As a result, many females apparently began incubation by 20 May; some males had

left by the second pair survey of Marten Creek on 26 May. The last male was seen on McDonald Creek on 22 June 1992 about 10 days earlier than reported in 1973-75 (Kuchel 1977, Ashley 1993). All young were nearly fledged by the end of July on the Lower Clark Fork drainages and 13 August on Trail Creek. However, most females and young were still present on 10-11 August at McDonald Creek in Glacier National Park, and some young were still downy.

Figure 1. Harlequin Duck Breeding Locations in Montana

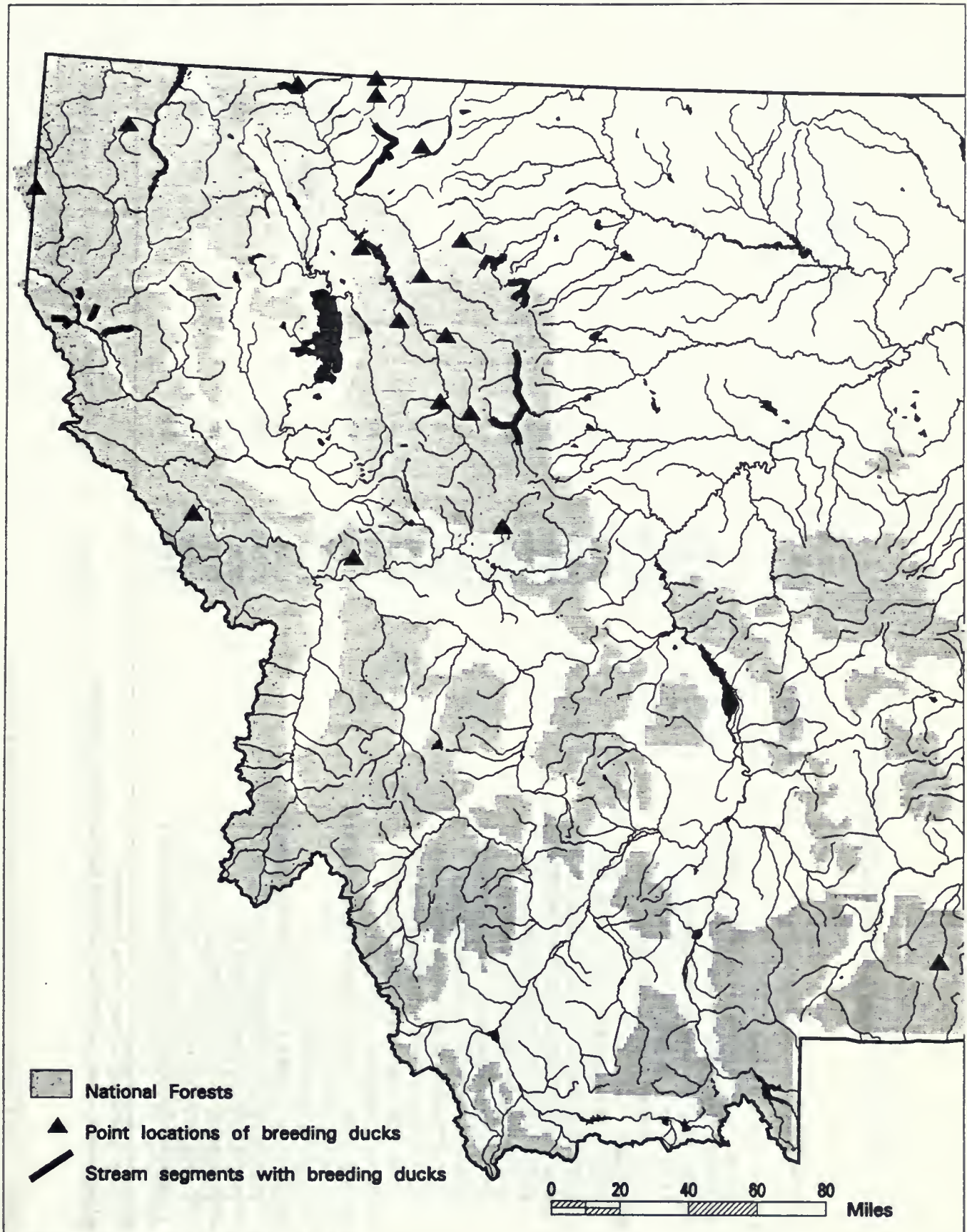


Table 1. Streams surveyed for Harlequin Ducks in 1993.

Stream & Segment	Date	kms	Harlequins						
			M	F	J	U	Pr	Br	
Kootenai National Forest									
Big Beaver Ck (T22N,R32W,S11 to T23N,R30W,S31)	1 Jun	19							
*Big Creek (T34N,R30W,S9 to T35N,R29W,S33)	30 May	19							
*Callahan Creek (T31N,R34W,S19 to S23)	28 May	10							
S Fork (T58N,R3E,S9 to T31N,R34W,S19)	28 May	8							
N Fork (T59N,R3E,S21 to T31N,R34W,S19)	28 May	7							
#Elk Creek									
E Fork (T25N,R34W,S11 to T26N,R34W,S33)	13 May	3							
#Grave Creek (T36N,R25W,S33 to T35N,R26W,S12)	10 May	8							
*Marten Creek (T25N,R32W,S32 to T25N,R33W,S28)	13 May	11	1				4		
S.Fork (T24N,R33W,S11 to T25N,R32W,S31)	13 May	4	1				1		
main T25N,R32W,S32 to T25N,R33W,S32	26 May	16	1						
S.Fork (T24N,R33W,S11 to T25N,R32W,S31)	26 May	4	2				1		
main T25N,R32W,S32 to T25N,R33W,S28	2 Jun	11	1				1		
S.Fork (T24N,R33W,S11 to T25N,R32W,S31)	2 Jun	3	2						
main T25N,R33W,S28 to T25N,R32W,S26	29 Jul	6		2	8				2(4,4)
S.Fork (T24N,R33W,S11 to T25N,R32W,S31)	29 Jul	4		1	6				2(4,2)
S.Fork (T24N,R33W,S11 to T25N,R32W,S31)	31 Jul	10					1		
*Rock Creek (T26N,R32W,S28 to S11)	11 May	18		1	1				1(1)
*Swamp Creek (T26N,R31W,S34 to T25N,R32W,S14)	30 Jul	7					1 (same as 7/30)		
T25N,R31W,S20 to S4	2 Aug	5					2		
T25N,R31W,S4 to T26N,R31W,S34	12 May	35	1						
*Vermillion R. (T24N,R31W,S14 to T24N,R29W,S27)	27 May	18						1	
T24N,R31W,S14 to T24N,R30W,S1	27 Jul	7			1				1(1)
T24N,R31W,S14 to T24N,R30W,S8	28 Jul	18		2	6				2(4,2)
T24N,R30W,S8 to T24N,R29W,S3	1 Aug	8							
T24N,R29W,S3 to S22	29 May	16							
#Yaak River (T35N,R33W,S17 to T34N,R33W,S27)									

* Harlequin breeding has occurred on the stream

Harlequins have been reported on the stream but status is not confirmed

Table 1. (cont.) Streams surveyed for Harlequin Ducks in 1993.

Stream	Date	kms	Harlequins					
			M	F	J	U	Pr	Br
Flathead National Forest								
#Big Creek (T33N,R20W,S30 to S22)	5 May	6	1					
T33N,R21W,S33NE to T33N,R20W,S22	9 Aug	20						
Coal Creek (T34N,R21W,S36 to T34N,R20W,S20)	17 Jun	7						
Dolly Varden Ck (T26N,R13W,S1 - T27N,R13W,S26)	30-31 Jul	7						
Lake Creek (T26N,R13W,S17 to S7)	31 Jul	5						
Long Creek (T28N,R15W,S29 to T27N,R15W,S5)	1 Aug	5						
Lost Creek (T25N,R17W,S31 to T24N,R18W,S1)	7 Jun	7						
*Middle Fork Flathead River								
(T27N,R13W,S8 to T29N,R16W,S14)	1-3 Aug	45		3	8			3(3,1,4)
Morrison Creek (T28N,R13W,S27 to T27N,R13W,S8)	28-29 Jul	11						
N. Fork Flathead River								
(T34N,R20W,S20 to T32N,R20W,S2)	17 Jun	18						
Schafer Creek (T26N,R13W,S4 to T27N,R13W,S26)	30 Jul	9						
*Spotted Bear River (T25N,R13W,S26 to S16)	14 Aug	5						
T25N,R13W,S16 to T25N,R15W,S17	15 Aug	23		1	4			1(4)
*Sullivan Creek (T26N,R16W,S31 to T25N,R16W,S5)	4 May	4						
T26N,R16W,S31 to T27N,R17W,S31	5 May	15						
T26N,R16W,S31 to T26N,R17W,S1	16 Aug	13						
*Trail Crk (T37N,R23W,S35NE to T37N,R22W,S36SE)	8 May	22	3				6	
T37N,R23W,S25SE to T37N,R22W,S34SW	9 May	9	3				5	
T37N,R23W,S25SW to T37N,R22W,S34SW	13 Aug	10		2	8			2(3,5)
#Whale Creek (T36N,R23W,S30SE to T36N,R21W,S30)	12 Aug	29						
Shorty Ck (T36N,R23W,S31SE to S29)	12 Aug	3						

* Harlequin breeding has occurred on the stream

Harlequins have been reported on the stream but status is not confirmed

Table 1. (cont.) Streams surveyed for Harlequin Ducks in 1993.

Stream	Date	kms	Harlequins					
			M	F	J	U	Pr	Br
Gallatin National Forest								
*Boulder River (T6S,R12E,S4 to T4S,R12E,S1)	12 Jun	23	5					
T6S,R12E,S28 to S4	13 Jun	7	1					
T2S,R13E,S15 to T1S,R14E,S28	14 Jun	16						
T6S,R12E,S28 to T4S,R12E,S36	22 Jul	30		1	1			1(1)
West Boulder R. (T3S,R11E,S25 to T2S,R13E,S15	14 Jun	29						
Lolo National Forest								
#Graves Creek (T22N,R30W,S11 to T23N,R30W,S25)	14 May	8						
*North Fork Blackfoot River								
T16N,R11W,S27 to T15N,R11W,S29	15 Jun	19						
T17N,R10W,S30 to T15N,R11W,S14	21 Jul	21						
*Trout Creek (T16N,R26W,S14 to T14N,R27W,S3)	4 Aug	28						
Custer National Forest								
Stillwater R. (T5S,R15E,S32 to T4S,R16E,S31)	25 Jul	19						
Kaniksu National Forest								
Lightning Creek (T56N,R3E,S7 to T55N,R2E,S3)	27 May	9						
Glacier National Park								
*Avalanche Creek (Avalanche Lk to McDonald Ck)	1 Aug	5						
*McDonald Creek								
Lake to Mineral Ck crossing of trail	10-11 Aug	24		6	16			
	Broods: 6(1,2,3,2,4,4)							

* Harlequin breeding has occurred on the stream

Harlequins have been reported on the stream but status is not confirmed

Table 2. Miscellaneous reports of Harlequin Ducks during 1993 and reports for prior years received during 1993.

Stream & Location	Date	Harlequins							Observer
		M	F	J	U	Pr	Br		
Kootenai National Forest									
Elk Creek T25N,R34W,S11	summer 1988		1	1+					F.S. Employee
East Fork T26N,R34W,S21 NW4NW4	16 May 93	1							Jill Davies
Grave Creek (T36N,R25W,S12)	6 Jun 93	1							Lynn Johnson
Marten Creek T25N,R32W,S31	22 July 93		1	5					1(5)E.Pfalzer & T.Hidy
Swamp Creek T25N,R31W,S16	15-16 May 93	1				1			Carolyn Hidy
White Pine Creek T23N,R32W,S28 SE4	Aug 1986		1	1+					F.S. Employee
Flathead National Forest									
Big Creek T33N,R21W,S33	late May 91		1						Mike Schwitters
Middle Fork Flathead R T32N,R18W,S33	18-19 Sep 93				3-5				Jim Williams
North Fork Flathead River									
Coal Banks to Anaconda Creek	1 Apr 93	1				1			John Gangemi
Spotted Bear River T25N,R13W,S36	4 Aug 1993				1				Cheryl Heisinger
Whale Creek T36N R23W S29 SE¼	21 Jun 93					1			Ben Conard
Gallatin National Forest									
Boulder River T6S,R12E,S4	30 May 93					1			George Fox
1-2 mi above Hells Canyon	ca 1 June 93				5				Todd Gehrke
1-2 mi above Hells Canyon	20 May 93	1							Todd Gehrke
Gallatin River (T5S,R4E,S25)	24 May 93	1							via Ron Kriger
T5S,R4E,S25	1 May 93	1							Brian Schwitters
Lolo National Forest									
Rattlesnake Creek T15N,R18W,S21	Jun 90					1			Joe Ball
lower creek	spring 1989					1			
lower creek	spring 1990					1			
lower creek	spring 1991					1			
Clark Fork River (Clinton-Turah)	28 Apr 93					1			Mr. Haning

Table 2 (cont.). Miscellaneous reports of Harlequin Ducks during 1993 and reports for prior years received during 1993.

Stream & Location	Date	Harlequins						Observer
		M	F	J	U	Pr	Br	
Glacier National Park								
Mineral Creek	28 Apr 93	1						John Gangemi
McDonald Creek						5		John Gangemi
(L. McDonald to Avalanche Ck)	1 May 93							

Reproduction

Harlequins were present this year on at least 12 streams in the study area and adult females or broods were seen on 11 of those streams. A minimum of 43 adult females were present. Late-July to early-August brood size on all streams averaged 2.81 ($n=21$). This was lower than in 1992 (3.27). Brood size did not vary between the North Fork Flathead and Lower Clark Fork drainages in 1993. Most broods were seen in Class III or fledged stages of development (Bellrose 1976:27), and we made no adjustment for age of broods in our calculation of mean brood size.

Of 37 potential broods on North Fork of the Flathead and lower Clark Fork drainages, a minimum of 16 were produced for a 43% success rate of broods per adult female. From 1989 to 1993 (Table 4), the success rate averaged 46.5% (range= 24-55%; $n=200$ pairs on 35 streams). In 1993, the differences in success rates between the North Fork Flathead drainage (32%) and the Lower Clark Fork drainage (60%) were large. Annual differences in success rates from 1989-1992 were primarily associated with the amount and timing of runoff. High runoff, particularly in June-early July, and runoff in years with "double peaks" caused lower reproductive success. This was particularly evident in 1991 (Table 4, Figure 2, 3) the only year where runoff exceeded 20,000 cfs and when production was lowest (24%). The changes in reproductive success were primarily due to changes in numbers of broods per pair, not changes in the size of successful broods. This indicates that differences in mortality were due to events that affected entire clutches or very young broods.

Capture and Marking

We continued to make good progress during the second year of the juvenile Harlequin Duck site fidelity and survival study. A total of 41 juvenile birds from 7 drainages were captured and marked (Table 5, Appendix D & E). Thirteen adult males and 14 adult females were also marked in 1993 (Table 5, Appendix D & E).

Relocation and marking effects

Table 6 shows when and where adults were marked and relocated, and if other ducks were present at the time. Of 6 adult birds marked in 1991 with nasal markers, 4 have been seen in subsequent years; however, 2 males not seen in 1992 were resighted in 1993. Of 11 adult birds marked with nasal discs in 1992, 6 were resighted in 1993. Of 2 females marked in 1991, both successfully raised broods in 1992, and one again in 1993. Of 5 females marked in 1992, 4 were resighted in 1993 and 2 of those successfully raised broods in 1993.

Of 13 adult birds (all females) marked with colored leg bands in 1992, 6 were resighted in 1993 and 2 of those successfully raised broods in 1993.

Adults marked with nasal discs were relocated in the second year at a slightly (non-significant) higher rate than birds marked with colored leg bands (47% versus 46%). Females marked with nasal discs which returned in the second year, successfully raised broods at higher rate than those marked with colored leg bands (57% versus 33%). These preliminary results indicate that the use of nasal discs on adult Harlequin females has little if any negative effect on survival or reproductive success.

Movements

Several movements of note were detected in 1993 (Table 6 and Table 7). A female marked on Marten Creek in August 1992 with a single juvenile was found in August 1993 on Swamp Creek, again with a single juvenile. The mouth of Swamp Creek is 6 km north east (across Noxon Reservoir) of the mouth of Marten Creek.

A female marked with 7 juveniles on McDonald Creek in August 1992 was seen again on McDonald Creek on 8 May 1993 with an unbanded male. On 11 May 1993 she was found with an unbanded male on Fish Creek (John Ashley, pers. comm.). The mouth of Fish Creek is 17 km southwest (across Lake McDonald) of the mouth of McDonald Creek.

Four Harlequins marked on McDonald Creek, Glacier National Park were recaptured or resighted on Hornby Island, off Vancouver Island in August 1993 and March 1994 (Table 7). However, in only a single case was the exact individual able to be identified. These are the first records of birds marked in Montana being relocated in coastal areas.

Figure 2. Hydrograph: 1988-1990 for the North Fork Flathead River near Columbia Falls, Montana.

N F FLATHEAD RIVER NEAR COLUMBIA FALLS, MT.

Hydrograph: 1988 - 1990

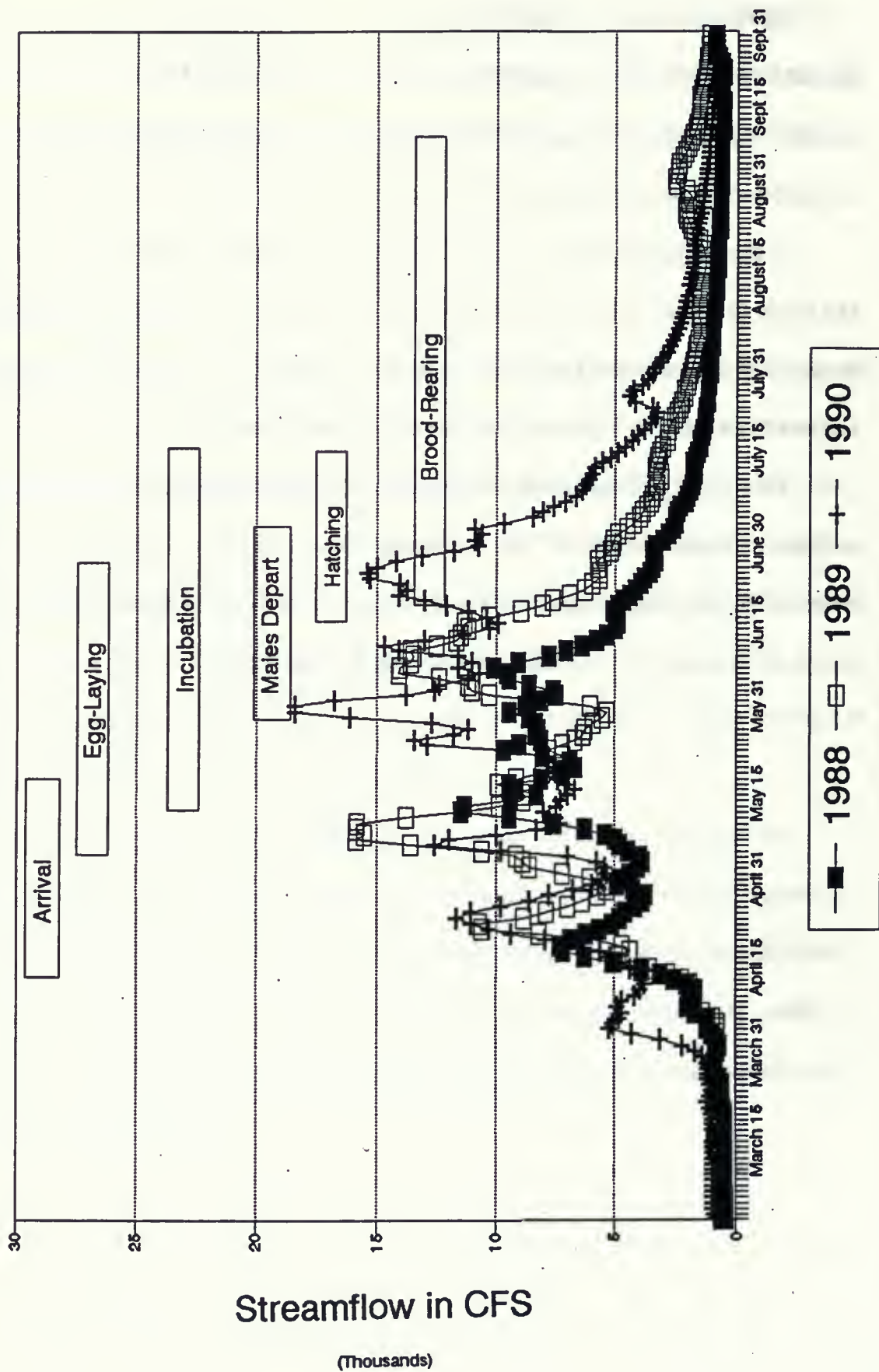


Figure 3. Hydrograph: 1991-1993 for the North Fork Flathead River near Columbia Falls, Montana.

N F FLATHEAD RIVER NEAR COLUMBIA FALLS, MT.

Hydrograph: 1990 - 1993

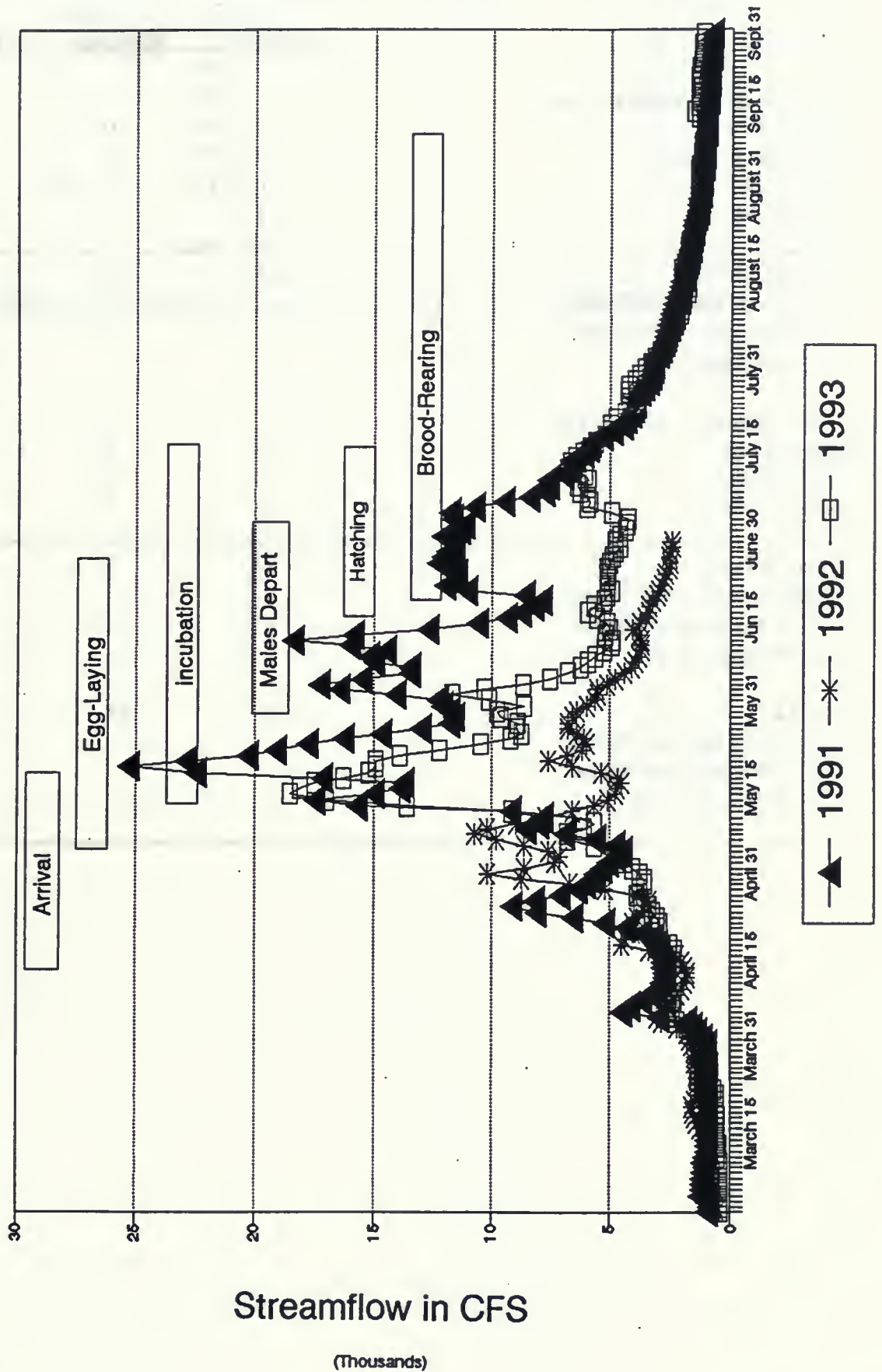


Table 3. Harlequin Duck reproduction in 1993 for streams with both pair and brood (at fledging) information.

Stream	#Adult ♀ ♀	#Broods	#Young
North Fork Flathead Drainage			
Big Creek	1	0	0
McDonald Creek	17	6	16
Trail Creek	6	2	8
Whale Creek	1	0	0
Drainage Total	25	8	24
0.32 Broods per adult female			
0.96 Young per adult female			
3.00 Young per brood			
Lower Clark Fork Drainage			
Marten Creek	5	2	8
Swamp Creek	2	1	1
Vermilion River	3	3	7
Drainage Total	10	6	16
0.60 Broods per adult female			
1.60 Young per adult female			
2.67 Young per brood			
TOTAL	35	14	40
0.40 Broods per adult female			
1.14 Young per adult female			
2.86 Young per brood			

Table 4. Harlequin Duck reproductive parameters 1988-1993.

Year	# adult females	broods per ad. female	young per ad. female	young per brood
1989	13	54%	3.15	5.86
1990*	31	55%	2.10	3.82
1991*	37	24%	0.84	3.44
1992*	71	55%	1.37	3.38
1993	48	44%	1.23	2.81
Mean		46.5%	1.74	3.86

* includes data from the Rocky Mountain Front (Diamond and Finnegan 1992, 1993)

Table 5. Summary of Harlequin Ducks marked in 1993.

Location	Male	Female	Juv.	Total
✓ McDonald Creek, Glacier NP	6	7	9	22
✓ Trail Creek, Flathead Co.	4	1	7	12
✓ Spotted Bear R., Flathead Co.		1	3	4
Vermillion River, Sanders Co.		2	7	9
Marten Creek, Sanders Co.	3	2	8	13
Swamp Creek, Sanders Co.			1	1
Rock Creek, Sanders Co.		1	6	7
TOTAL	13	14	41	68

Table 6. Sightings and recaptures in Montana of adult Harlequins marked in Montana 1991-1992 and adult females marked in spring 1993.

Stream/Bird	Sex	1991		1992		1993	
		Spr	Sum	Spr	Sum	Spr	Sum
Marten Creek							
765-27556	♀	w/♂27555		w/♂	w/4j	w/♂	w/4j
765-27559	♀	w/♂27560		seen	w/4j	-	-
755-76007	♀				w/1j	-	w/1j on Swamp Creek
755-76011	♀				w/4j	w/♂	-
755-76074	♀					w/♂76078	-
765-27555	♂	w/♀27556		-		-	
765-27560	♂	w/♀27559		-		w/♀	
765-27557	♂	w/♂27558		-		w/♀	
765-27558	♂	w/♂27557		-		-	
765-27561	♂			alone		-	
Vermillion River							
765-27562	♂			alone			
Trail Creek							
755-76045	♀				w/4j	w/♂76070	w/3j
765-27564	♀			w/♂27563	w/4j	w/♂27563	-
765-27566	♀			w/♂27565	-	w/♂76073	-
765-27563	♂			w/♀27564		w/♀27564	
765-27565	♂			w/♀27566		-	
765-27567	♂			w/♀		-	
Spotted Bear River							
765-27596	♀				w/3j		-

Table 6. (cont.) Sightings and recaptures in Montana of adult Harlequins marked in Montana 1991-1992 and adult females marked in spring 1993.

Stream/Bird	Sex	1991		1992		1993	
		Spr	Sum	Spr	Sum	Spr	Sum
McDonald Creek drainage							
755-76025	♀				w/(8-9)j	w/♂ #	-
755-76031	♀				w/3j	w/♂	7/20 ⁺
755-76033	♀				w/2j	w/♂	w/2j
755-76036	♀				w/1j	-	-
755-76038	♀				w/3j	-	-
755-76039	♀				w/2j	-	-
755-76051	♀				w/4j	-	-
755-76054	♀				w/4j	-	-
765-27571	♀				w/3j	w/♂	7/28 ⁺
765-27573	♀				w/7j	w/♂ @	-
765-27579	♀				w/4j	-	-
765-27585	♀				w/1j	-	-
765-27586	♀				w/2j	w/♂76067	w/3j
755-76060	♀					w/♂76059	7/19 ⁺
755-76062	♀					w/♂76061	7/20 ⁺
755-76064	♀					w/♂76063	w/2j*
755-76065	♀					w/♂76066	-
755-76069	♀					w/♂76068	6/8 ⁺

* last date seen (Ashley pers. comm.)

* female not seen from 6/8/93 until recaptured 8/1/93 despite weekly surveys (Ashley pers. comm.)

female w/ unbanded male on lower McDonald Creek 5/8 and on Fish Creek 5/11; not seen subsequently (Ashley pers. comm.)

@ female w/ unbanded male on Avalanche Creek on 5/10; not seen subsequently (Ashley pers. comm.)

Table 7. Sightings and recaptures of Harlequins on the Pacific Ocean which were originally marked in Glacier National Park, Montana.

Bird	Date		Age when Marked	Sex	Date		Place relocated
	Marked				Relocated		
755-76063	5/7/93		Adult	♂	8/4/93		Hornby Is. (Heron Rock) off Vancouver Island, B.C.
775-38606?	8/11/93		Juv.	♀	3/15/94		Hornby Is. (Ford's Cove) Vancouver Isl.
755-76040?	8/11/92		Juv.	♀	"		"
755-76056?	9/2/92		Juv.	♀	"		"
	reported as ♀ with w/y p/s with plastic bands cut in half; 606 is w/y-4 p/s with wire style bands; 040 is w/o p/s with plastic bands cut in half; 056 is y/w p/s with plastic bands cut in half.						
775-38606?	8/11/93		Juv.	?	3/15/94		Hornby Is. off Vancouver Island, B.C.
	however reported as ♀ with w/o-4 w/s with top wire bands, while 606 is w/y-4 p/s with wire style bands; yellow-4 could easily be mistaken for orange-4; no orange-4 bands are known to have been used anywhere in North America.						
775-38599	8/10/93		Juv.	?	3/14/94		Hornby Is. off Vancouver Island, B.C.
	however reported as ♀ with p/s y while 599 is p/s y/y-1; if a right band came off and only a single yellow band was present it could have been any of 10 birds marked as juveniles (all in GNP) in 1992 and 1993						

MANAGEMENT RECOMMENDATIONS AND RESEARCH NEEDS

Adult Harlequins show strong fidelity to breeding sites (Bengston 1972, Kuchel 1977, Dzinbal 1982, Wallen 1987). The extent of fidelity to natal areas by adults breeding for the first time is unknown, but is likely to be strong. Colonization of currently unoccupied streams is likely to be a rare event. Harlequins appear sensitive to human disturbance (Clarkson 1992, Cassirer and Groves 1991). Repeated disturbances may discourage nesting at traditional sites and reduce productivity (Rodrick and Milner 1991). However, proximity to trails and roads does not always correlate with reduced reproductive success. Sixty percent of Harlequin sites were within 50 m of trails on the Rocky Mountain Front (Diamond and Finnegan 1992). In this case, most Harlequin streams are located in roadless or wilderness areas and receive limited human activity prior to or during the nesting period.

Mid-stream loafing sites are important in breeding areas (Cassirer and Groves 1990). Brood rearing areas in Idaho and Montana west of the Continental Divide have a dense shrub or timber/shrub mosaic on the banks (Cassirer and Groves 1989, Gangemi 1991). East of the Divide in Montana stream banks are more open, and most observation sites had banks composed of gravel, grass-forb, or bedrock habitat (Diamond and Finnegan 1992, Markum and Genter 1990). Low benthic macroinvertebrate biomass may limit the number and productivity of Harlequins (Bengston and Ulfstrand 1971, Kuchel 1977). Given these factors, we recommend the following management strategies on Harlequin streams:

- 1) minimize unnecessary human activity along Harlequin streams during May through August;
 - 2) a stream buffer of > 50 m should be maintained on both sides of streams for most activities;
- roads and trails should be > 100 m from streams and not visible from the streams;

- 3) major activities (road building, timber harvest, restoration projects, etc.) that are to be undertaken within 300 m of a stream should be done during the period 15 August - 1 April;
- 4) minor activities within stream buffers (e.g. trail maintenance or reconstruction) should not be performed during 1 May - 15 July;
- 5) avoid activities which will change stream runoff patterns or decrease water quality;
- 6) in any area where major management activities are to take place in potential Harlequin habitat, survey for the preceding two years both for pairs (May) and broods (mid-July to mid-August). If Harlequins are present, develop a monitoring plan for Harlequins during and after the activity is to take place.

Long term research and management needs involve:

- 1) develop a baseline status report of current and historic Harlequin populations in Montana (currently in preparation);
- 2) investigate site fidelity, inter-stream movement, reproduction and mortality to allow estimations and modeling of what constitutes a viable Harlequin population (began in 1992);
- 3) determining the primary limiting factors for Harlequin Duck populations in occupied and historic habitat situations in the Northern Rockies;
- 4) developing standardized surveying protocols for occupied and potential Harlequin streams;
- 5) developing management guidelines for maintaining Harlequin populations and habitat; and
- 6) assess the impacts of past and current habitat modification and develop techniques to restore Harlequin populations and habitat.

LITERATURE CITED

- American Ornithologists' Union. 1983. Check-list of North American birds, 6th edition. Allen Press, Lawrence, Kans. 877 pp.
- Ashley, J. 1992. A summary of documented harlequin duck observations in Glacier National Park, 1874-1992. Unpubl. Report, Glacier Natl. Park, West Glacier, Mont. 19 pp.
- Bellrose, F.C. 1976. Ducks, geese and swans of North America. Stackpole Books, Harrisburg, Penn. 540 pp.
- Bengtson, S.A. 1966. Field studies on the harlequin duck in Iceland. Wildfowl Trust Ann. Rep. 17:79-94.
- Bengtson, S.A. 1972. Breeding ecology of the harlequin duck *Histrionicus histrionicus* (L.) in Iceland. Ornis Scand. 3:1-19.
- Bengtson, S.A. and S. Ulfstrand. 1971. Food resources and breeding frequency of the harlequin duck, *Histrionicus histrionicus*, in Iceland. Oikos 22:235-239.
- Carlson, J.C. 1990. Results of harlequin duck (*Histrionicus histrionicus*) surveys in 1990 on the Flathead National forest, Montana. Mont. Nat. Heritage Prog., Helena. 32 pp.
- Cassirer, E.F., A. Breault, P. Clarkson, D.L. Genter, R.I. Goudie, B. Hunt, S. C. Latta, G.H. Mittelhauser, M. McCollough, G. Schirato, and R.L. Wallen. 1993. Status of harlequin ducks (*Histrionicus histrionicus*) in North America. Report of the Harlequin Duck Working Group. 83 pp.
- Cassirer, E.F. and C.R. Groves. 1989. Breeding ecology of harlequin ducks (*Histrionicus histrionicus*) on the Kaniksu National Forest, Idaho. Idaho Dept. Fish Game, Nongame Endangered Wildl. Prog. 48 pp.
- Cassirer, E.F. and C.R. Groves. 1990. Distribution, habitat use, and status of harlequin ducks in northern Idaho, 1990. Idaho Dept. Fish Game, Nongame Endangered Wildl. Prog. 54 pp.
- Cassirer, E.F. and C.R. Groves. 1991. Harlequin duck ecology in Idaho: 1987-1990. Idaho Dept. Fish Game, Nongame Endangered Wildl. Prog. 93 pp.
- Clarkson, P. 1992. A preliminary investigation into the status and distribution of harlequin ducks in Jasper National Park. Unpubl. Tech. Rep. Heritage Resource Conservation, Jasper National Park. 65 pp.
- Diamond, S. and P. Finnegan. 1992. Harlequin duck ecology on Montana's Rocky Mountain Front. USDA, Lewis and Clark Natl. For., Rocky Mountain Ranger Dist., Choteau, MT. 45 pp.

- Diamond, S. and P. Finnegan. 1993. Harlequin duck ecology on Montana's Rocky Mountain Front. USDA, Lewis and Clark Natl. For., Rocky Mountain Ranger Dist., Choteau, MT. 73 pp.
- Dzinbal, K.A. 1982. Ecology of harlequin ducks in Prince William Sound, Alaska during summer. Unpubl. M.S. Thesis, Ore. State Univ., Corvallis. 89 pp.
- Fairman, L. and G. Miller. 1990. Results of the 1990 survey for harlequin ducks (*Histrionicus histrionicus*) on the Kootenai National Forest, Montana and parts of the Lolo National Forest, Montana. Mont. Nat. Heritage Prog., Helena. 41 pp.
- Gangemi, J.T. 1991. Results of harlequin duck (*Histrionicus histrionicus*) surveys on the non-wilderness portion of the Flathead National Forest, Montana. Mont. Nat. Heritage Prog., Helena. 29 pp.
- Genter, D.L. 1992. Animal species of special concern. Unpubl. Rep., Mont. Nat. Heritage Prog., Helena. 9 pp.
- Genter, D.L. 1993. Harlequin duck status report 1992: Montana. pp.31-34 in E.F. Cassirer et. al, Status of harlequin ducks (*Histrionicus histrionicus*) in North America. Report of the Harlequin Duck Working Group. 83 pp.
- Goudie, R.I. 1993. Harlequin duck status report: eastern Canada. pp 65-74 in E.F. Cassirer et. al, Status of harlequin ducks (*Histrionicus histrionicus*) in North America. Report of the Harlequin Duck Working Group. 83 pp.
- Kerr, R. 1989. Field survey summary report of the harlequin duck (*Histrionicus histrionicus*) of the Kootenai National Forest, Montana. Unpubl. Rep. 10 pp.
- Kuchel, C.R. 1977. Some aspects of the behavior and ecology of harlequin ducks breeding in Glacier National Park, Montana. M.S. Thesis, Univ. Mont., Missoula. 156 pp.
- Markum, D. and D.L. Genter. 1990. Preliminary report on the distribution and status of the harlequin duck (*Histrionicus histrionicus*) on the Gallatin National Forest, Montana. Montana Natural Heritage Program. Helena. Unpubl. Rep. 22 pp.
- Miller, V.E. 1988. Harlequin ducks (*Histrionicus histrionicus*) 1988 results of field surveys in west-central, Montana. Unpubl. rep. 13 pp.
- Miller, V.E. 1989. 1989 field survey report: harlequin duck (*Histrionicus histrionicus*), Lower Clark Fork River drainage, west-central, Montana. Unpubl. rep. on file Mont. Nat. Heritage Prog., Helena. 48+ pp.

- Moseley, R. and C. Groves. 1990. Rare, threatened and endangered plants and animals of Idaho. Unpubl. Rep., Nat. Heritage Sect., Nongame and Endangered Wildl. Prog., Idaho Dept. Fish Game, Boise. 33 pp.
- Reel, S., L. Schassberger, and W. Ruediger. 1989. Caring for our natural community: Region 1 - Threatened, Endangered & Sensitive Species Program. USDA, For. Serv. N. Region, Missoula, MT. 309 pp. + appendices
- Rodrick, E. and R. Milner. 1991. Management recommendations for Washington's priority habitats and species. Wash. Dept. Wildl., Olympia.
- U.S. Department of Interior. 1991. Endangered and Threatened Wildlife and Plants; Animal Candidate Review for Listing as Endangered or Threatened Species, Notice of Review. Federal Register 56 (225):58804-58836.
- Wallen, R.L. 1987. Habitat utilization by harlequin ducks in Grand Teton National Park. Unpubl. M.S. Thesis, Mont. State Univ., Bozeman. 67 pp.

APPENDICES

Appendix A. Data forms

Harlequin Duck Survey Form.

____ of ____

Date _____ Time _____ Surveyor(s) _____
(Start/Finish)

Stream _____
Include map with exact area(s) surveyed on back of this page

Weather _____
(Temp., wind dir & speed, cloud cover, precip last 24 hrs)

Accessibility? _____
=====

Group # _____ # Individuals _____
(Put on map)

Sexes & Ages _____

Marked? _____

Accessibility? _____

Group # _____ # Individuals _____
(Put on map)

Sexes & Ages _____

Marked? _____

Accessibility? _____

Group # _____ # Individuals _____
(Put on map)

Sexes & Ages _____

Marked? _____

Accessibility? _____

NOTES: _____

Harlequin Duck Banding Form.

Date_____ Location_____

Sex_____ Age_____ T_____ N, R_____ W, Section_____

Nasal Saddles Color Bands

Band #_____ Lft_____ Rt_____ Lt_____ Rt_____

Weight_____ Wing chord_____ Tail_____ Tarsus_____

Molt_____

Notes_____

(with other ducks? marked, sex, age? etc.)

+++++

Date_____ Location_____

Sex_____ Age_____ T_____ N, R_____ W, Section_____

Nasal Saddles Color Bands

Band #_____ Lft_____ Rt_____ Lt_____ Rt_____

Weight_____ Wing chord_____ Tail_____ Tarsus_____

Molt_____

Notes_____

(with other ducks? marked, sex, age? etc.)

+++++

Date_____ Location_____

Sex_____ Age_____ T_____ N, R_____ W, Section_____

Nasal Saddles Color Bands

Band #_____ Lft_____ Rt_____ Lt_____ Rt_____

Weight_____ Wing chord_____ Tail_____ Tarsus_____

Molt_____

Notes_____

(with other ducks? marked, sex, age? etc.)

+++++

NOTES:

**Appendix B. List of Harlequin Ducks marked in 1993
or marked in previous years and sighted in 1993.**

Appendix B

Harlequin Duck marking outside Glacier National Park utilizing nasal discs and USFWS bands.

C = Circle

red = red

yel = yellow

wht = white

T = Triangle

grn = green

blk = black

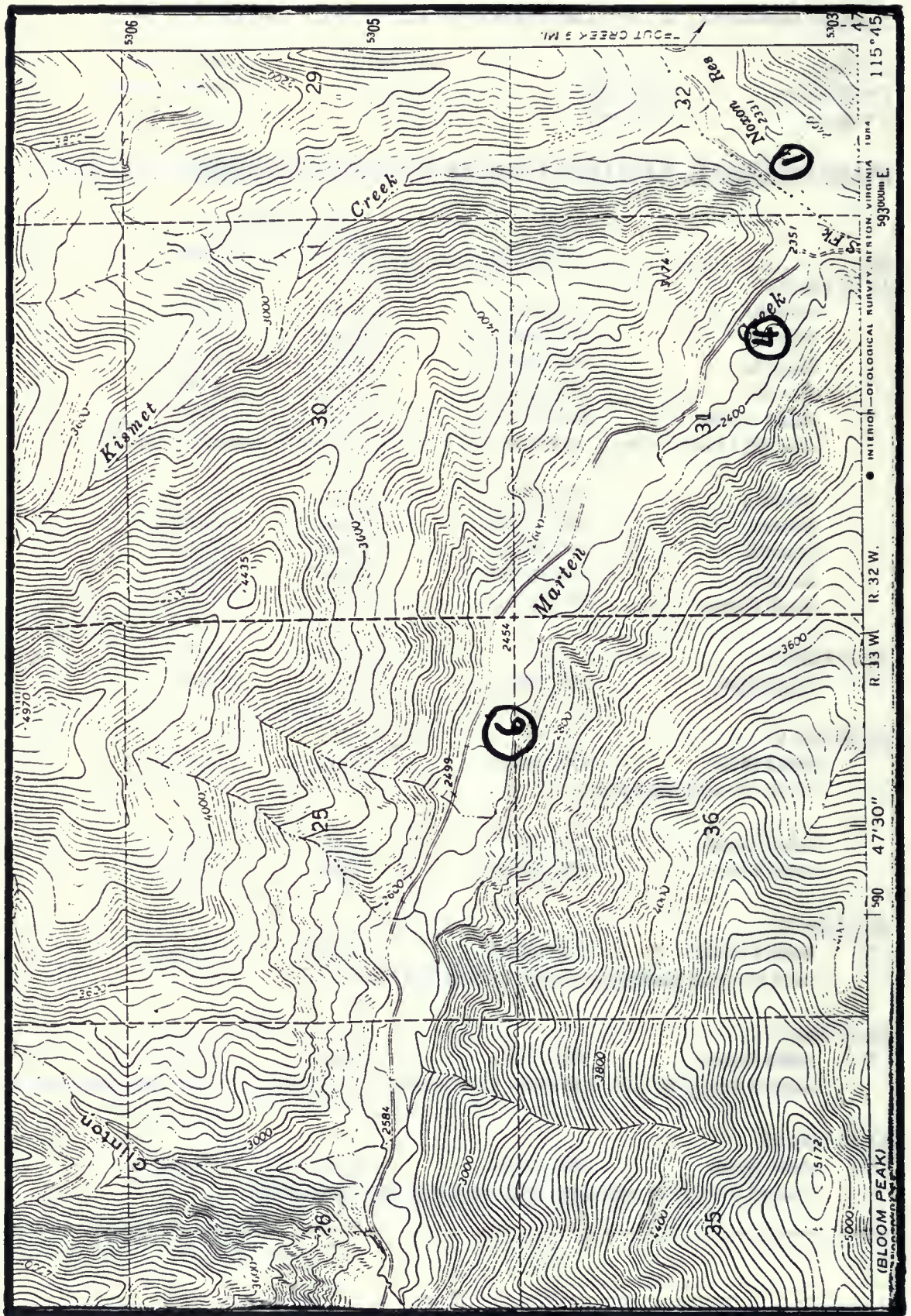
ora = orange

S = Square

blu = blue

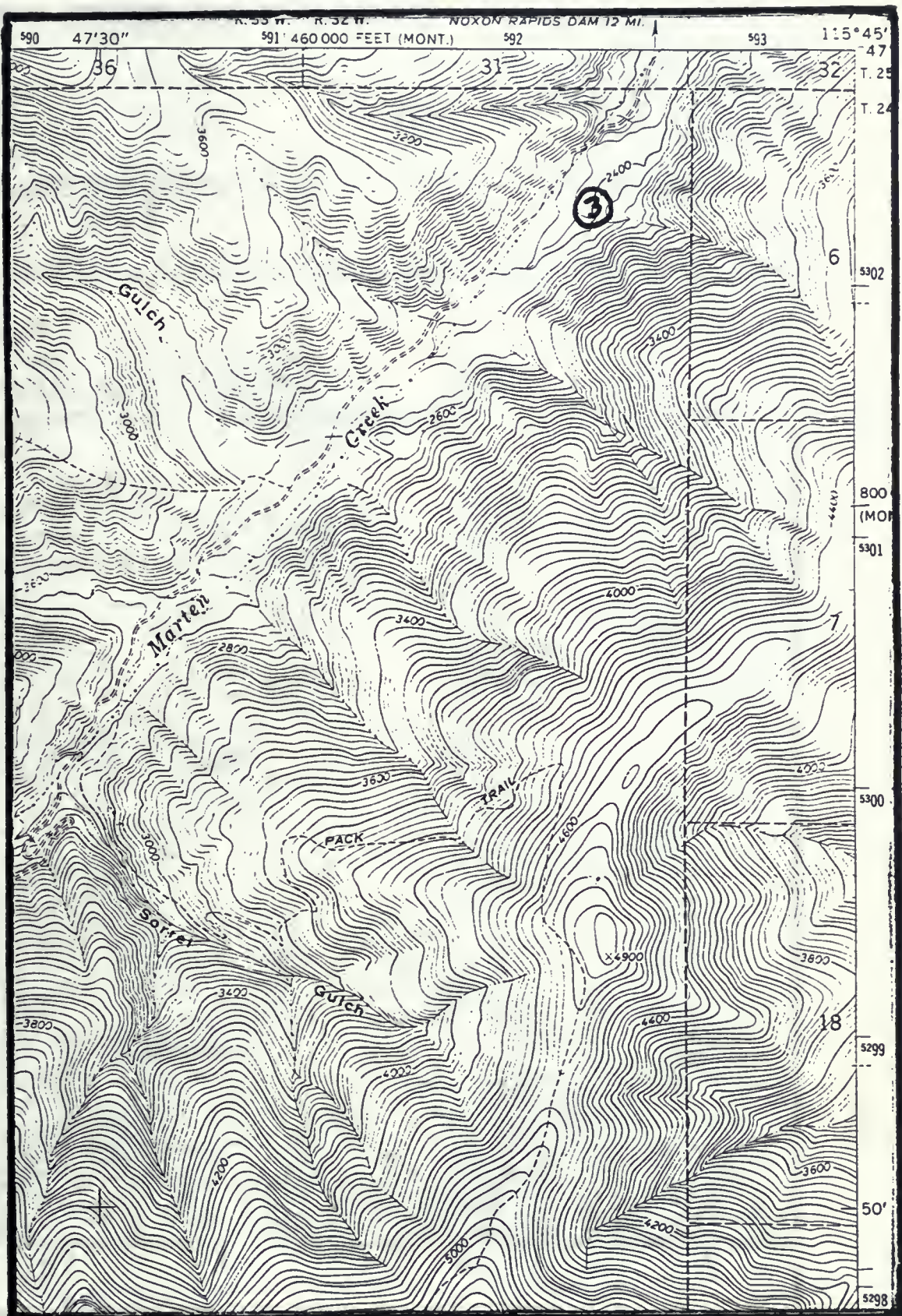
MARTEN CREEK, KOOTENAI NATIONAL FOREST, SANDERS CO., MT

Site	USFWS Band #	Nasal Discs	
		left	right
1) 29 July 93			
Juvenile	755-76087	S-ora	C-blu
Juvenile	755-76088	C-wht	S-ora
Juvenile	755-76089	S-ora	C-blu
Juvenile	755-76090	S-ora	C-whi
** Adult Female	765-27556	T-blk	T-blk
(caught 15 May 91 with adult male 765-27555; had brood of 4 chicks 5 Aug 92)			
Juvenile	755-76091	C-grn	T-yel
Juvenile	755-76092	C-grn	S-blu
Juvenile	755-76093	C-whi	S-grn
Juvenile	755-76094	S-ora	S-grn
Adult Female	755-76095	S-ora	T-yel
2) 26 May 93			
Adult Male	755-76075	C-grn	C-blu
3) 26 May 93			
Adult Male	755-76076	C-grn	S-ora
(with one unmarked male)			
Adult Female	755-76074	C-grn	C-whi
Adult Male	755-76078	C-grn	C-whi
4) 2 June 93			
** Adult Female	755-76074	C-grn	C-whi
with male but markings not seen; marked 26 May 93			
5) 13 May 93			
** Adult Female	755-76011	T-yel	T-grn
marked 4 Aug 92 with 4 juveniles (755-76009-10, 755-76012-13); seen with unmarked male			
6) 13 May 93			
** Adult Male	765-27557	T-yel	T-grn
marked 29 May 91 with other male; seen with unmarked female			

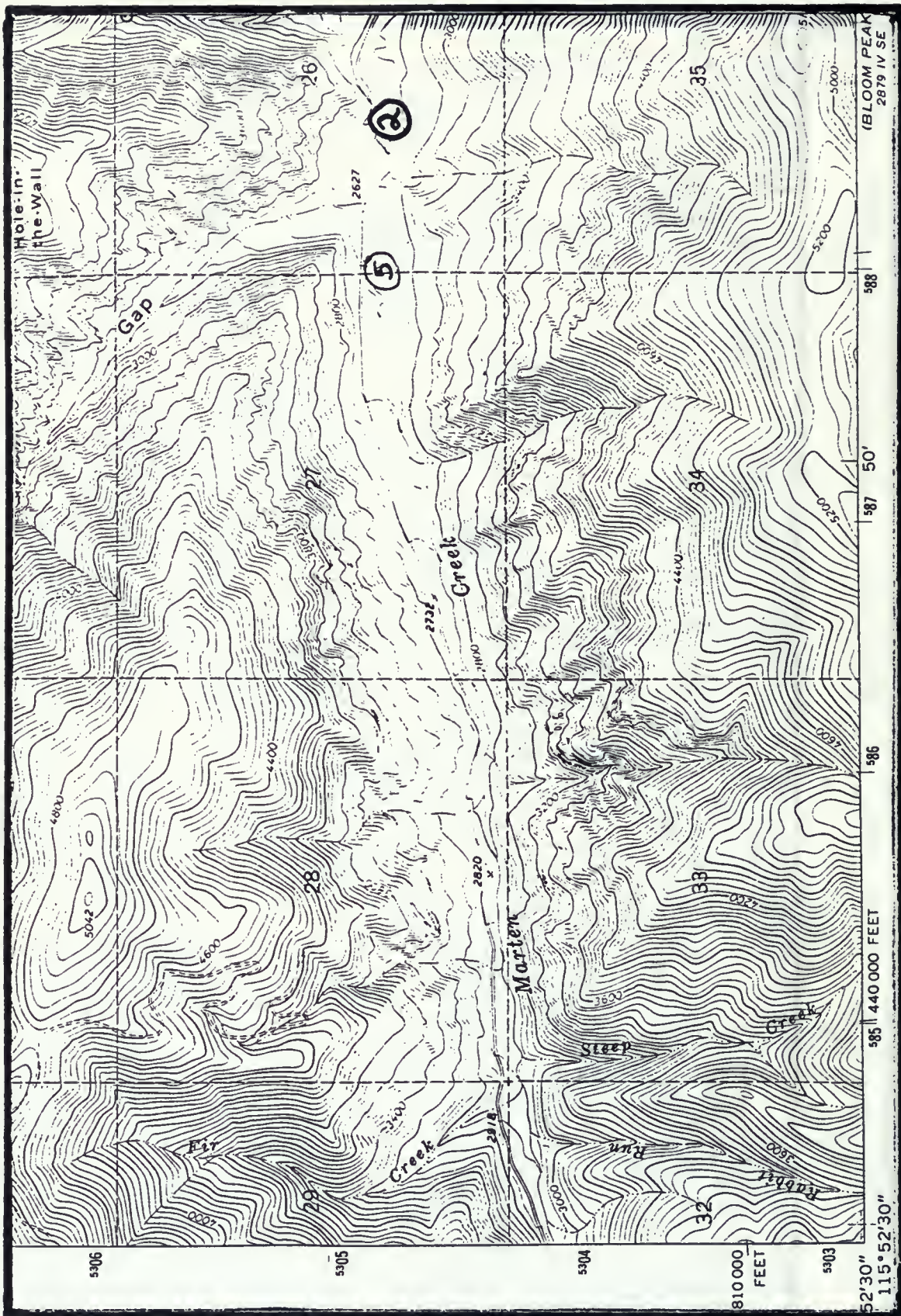


Marten Creek harlequin duck marking sites, 1993.

Quad: Noxon



Marten Creek harlequin duck marking sites, 1993.
Quad: Bloom Peak



Marten Creek harlequin duck marking sites, 1993.
 Quad: Noxon

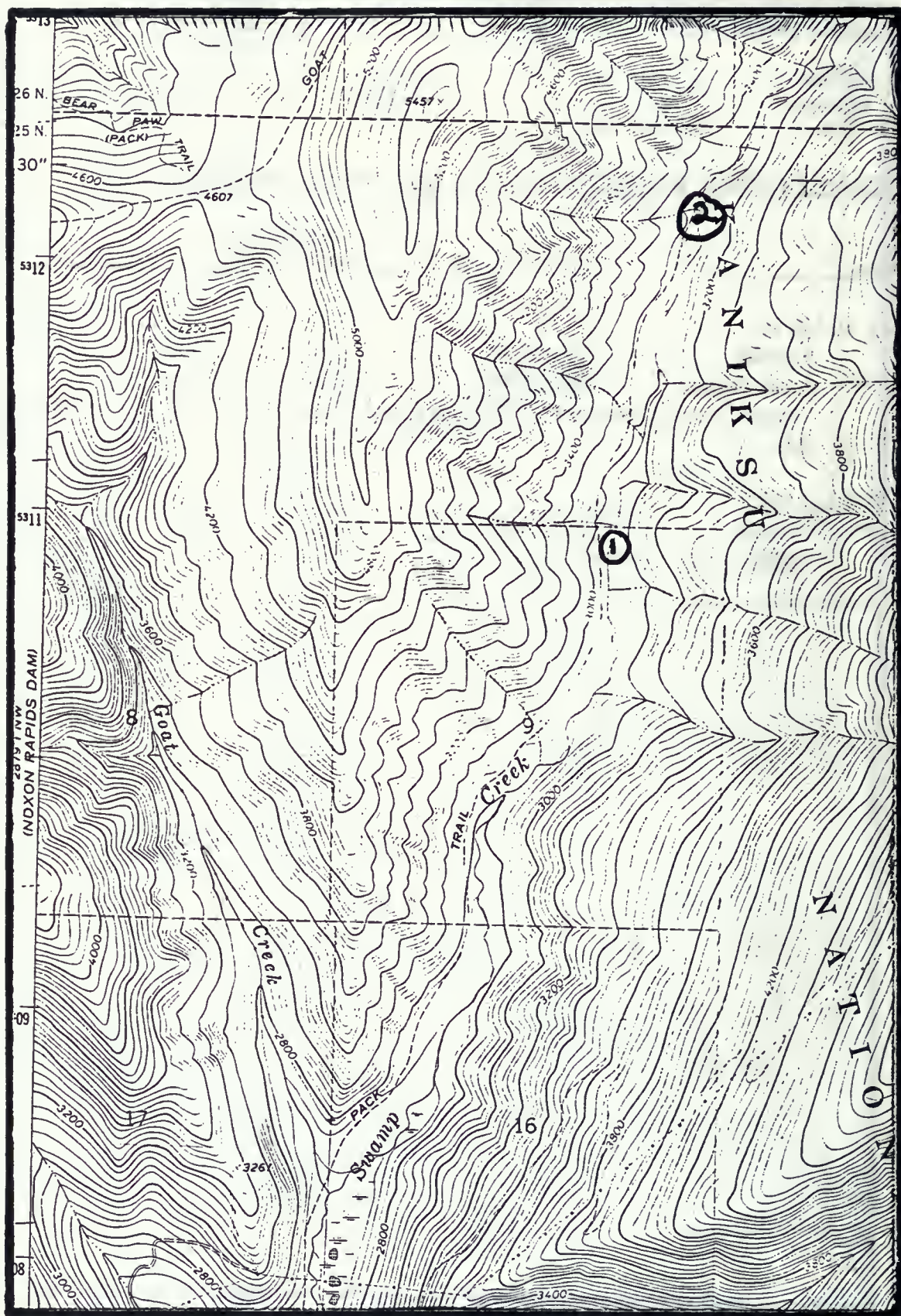
Appendix B (cont.)

Harlequin Duck marking outside Glacier National Park utilizing nasal discs and USFWS bands.

C = Circle	red = red	yel = yellow	wht = white
T = Triangle	grn = green	blk = black	ora = orange
S = Square	blu = blue		

SWAMP CREEK, KOOTENAI NATIONAL FOREST, SANDERS CO., MT

Site	USFWS Band #	Nasal Discs	
		left	right
1) 30 July 93			
Juvenile	755-76096	T-grn	S-ora
** Adult Female	755-76007	T-blk	T-grn
(caught 4 Aug 92 at mouth of <u>Marten Creek</u> ; had brood of 1 chick which could probably fly)			
2) 2 Aug 1993			
** Juvenile	755-76096	T-grn	S-ora
sighting of bird marked 30 July 93			



Swamp Creek harlequin duck marking sites, 1993.
 Quad: Goat Peak

Appendix B (cont.)

Harlequin Duck marking outside Glacier National Park utilizing nasal discs and USFWS bands.

C = Circle

red = red

yel = yellow

wht = white

T = Triangle

grn = green

blk = black

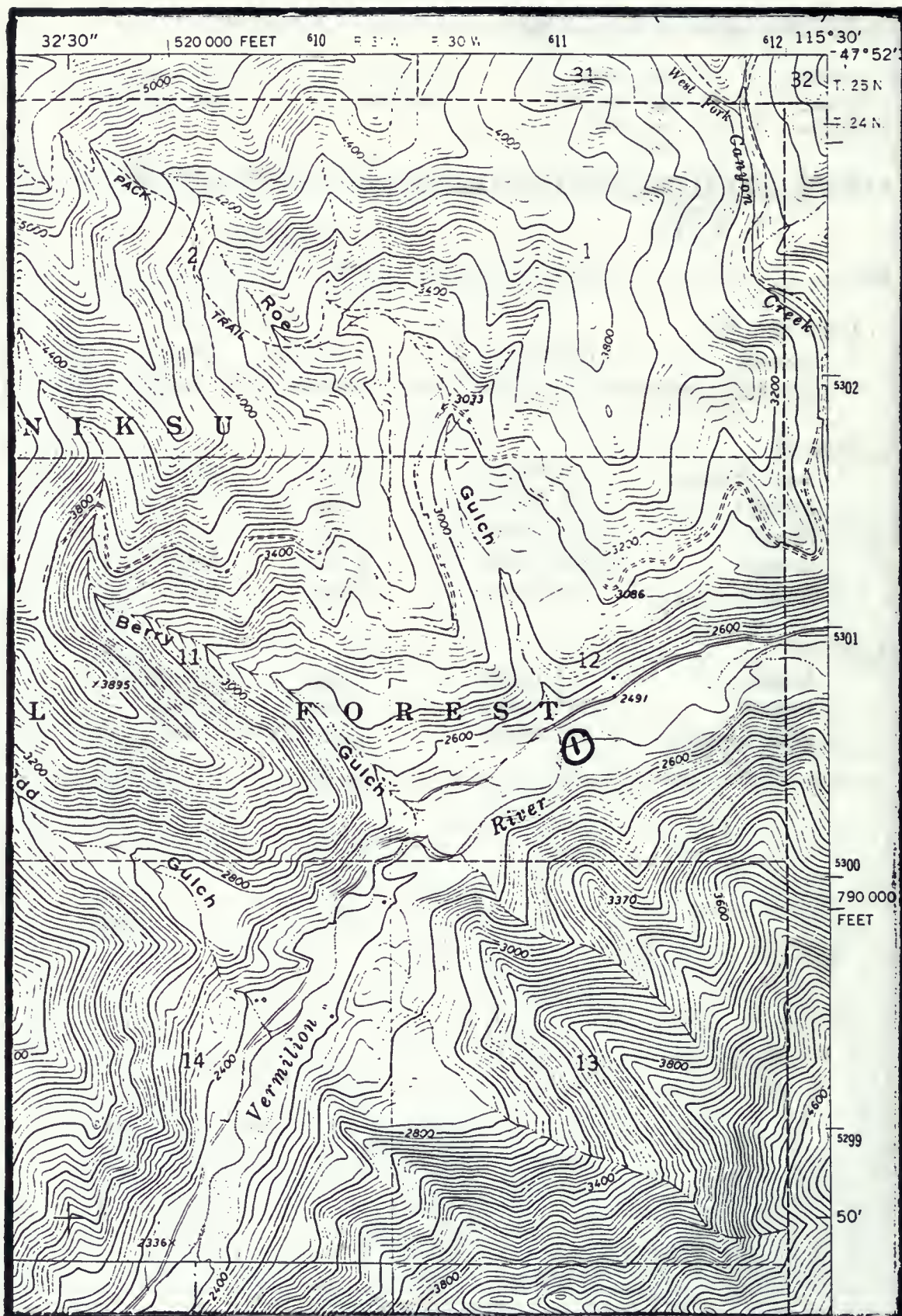
ora = orange

S = Square

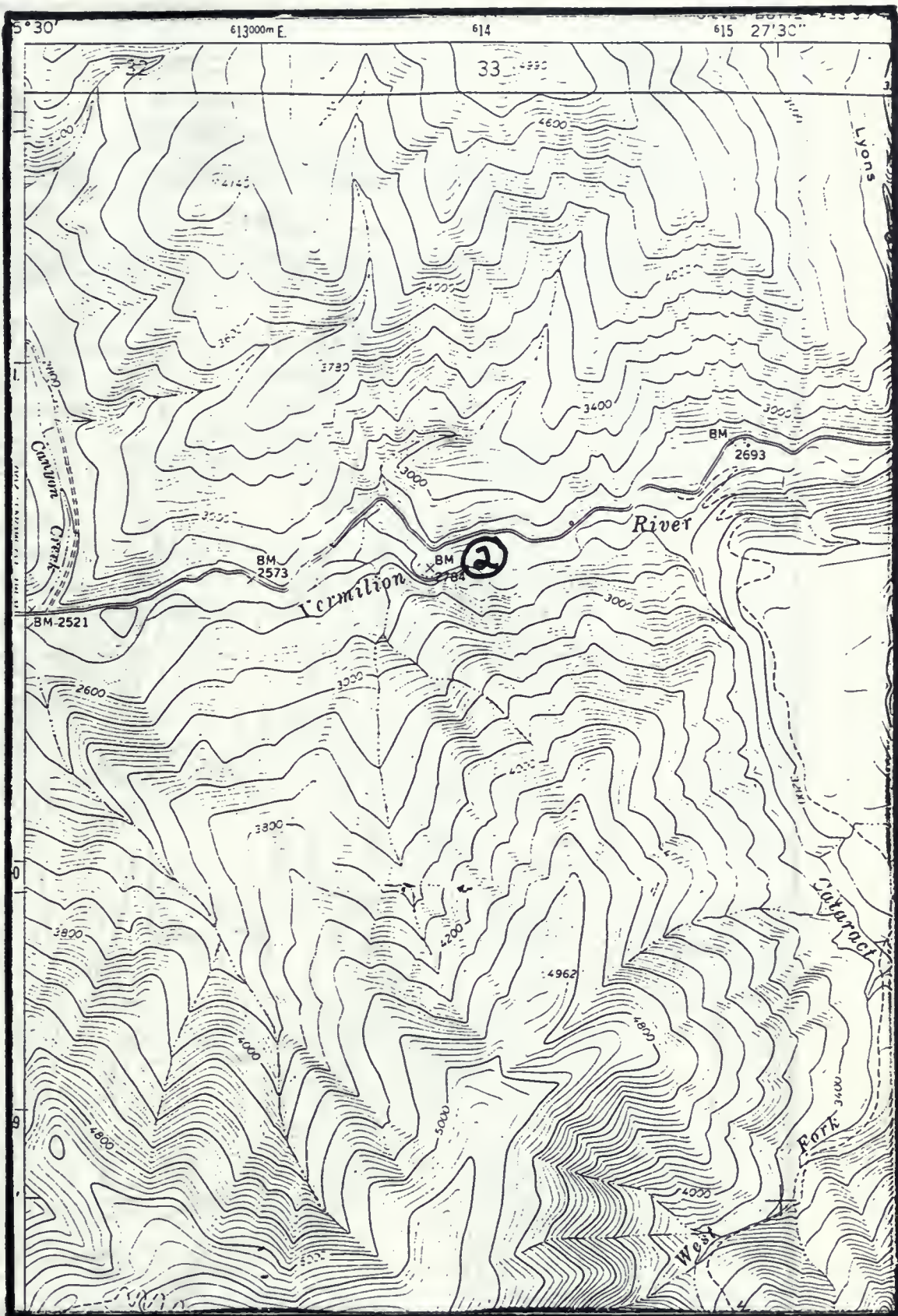
blu = blue

VERMILLION RIVER, KOOTENAI NATIONAL FOREST, SANDERS CO., MT

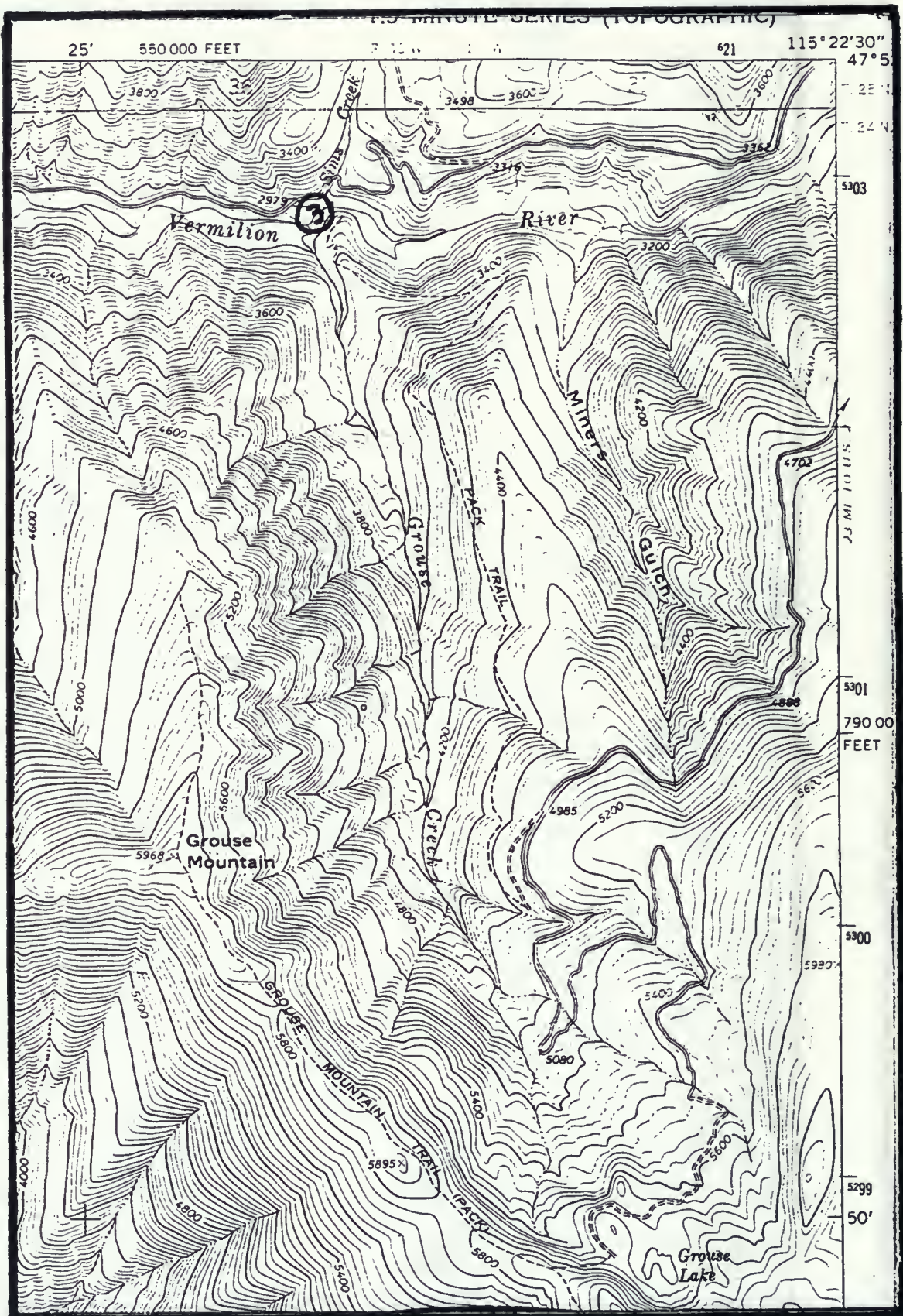
Site	USFWS Band #	Nasal Discs	
		left	right
1) 27 Jul 93			
Juvenile	755-76077	C-blu	T-blk
(no accompanying adult; too large to belong to other broods caught on Vermilion River)			
2) 28 Jul 93			
Adult Female	755-76079	S-ora	C-grn
Juvenile	755-76080	S-ora	T-blk
Juvenile	755-76081	T-blk	S-ora
Juvenile	755-76082	T-yel	S-grn
Juvenile	755-76083	S-grn	S-ora
3) 28 Jul 93			
Juvenile	755-76084	S-red	C-grn
Juvenile	755-76085	T-blk	S-blu
Adult Female	755-76086	C-grn	S-ora



Vermilion River harlequin duck marking sites, 1993.
 Quad: Trout Creek



Vermilion River harlequin duck marking sites, 1993.
Quad: Seven Point Mountain



Vermilion River harlequin duck marking sites, 1993.
 Quad: Seven Point Mountain

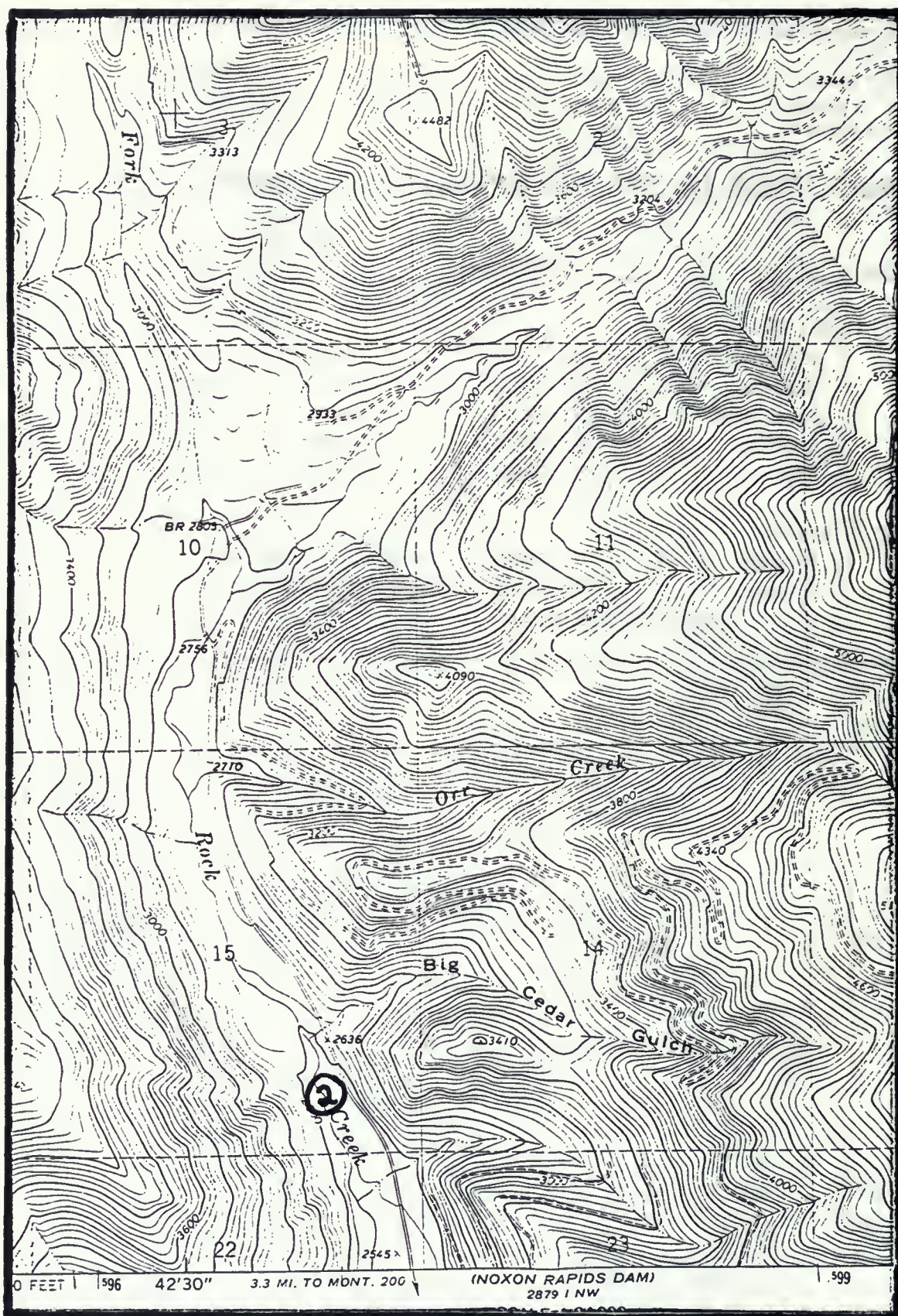
Appendix B (cont.)

Harlequin Duck marking outside Glacier National Park utilizing nasal discs and USFWS bands.

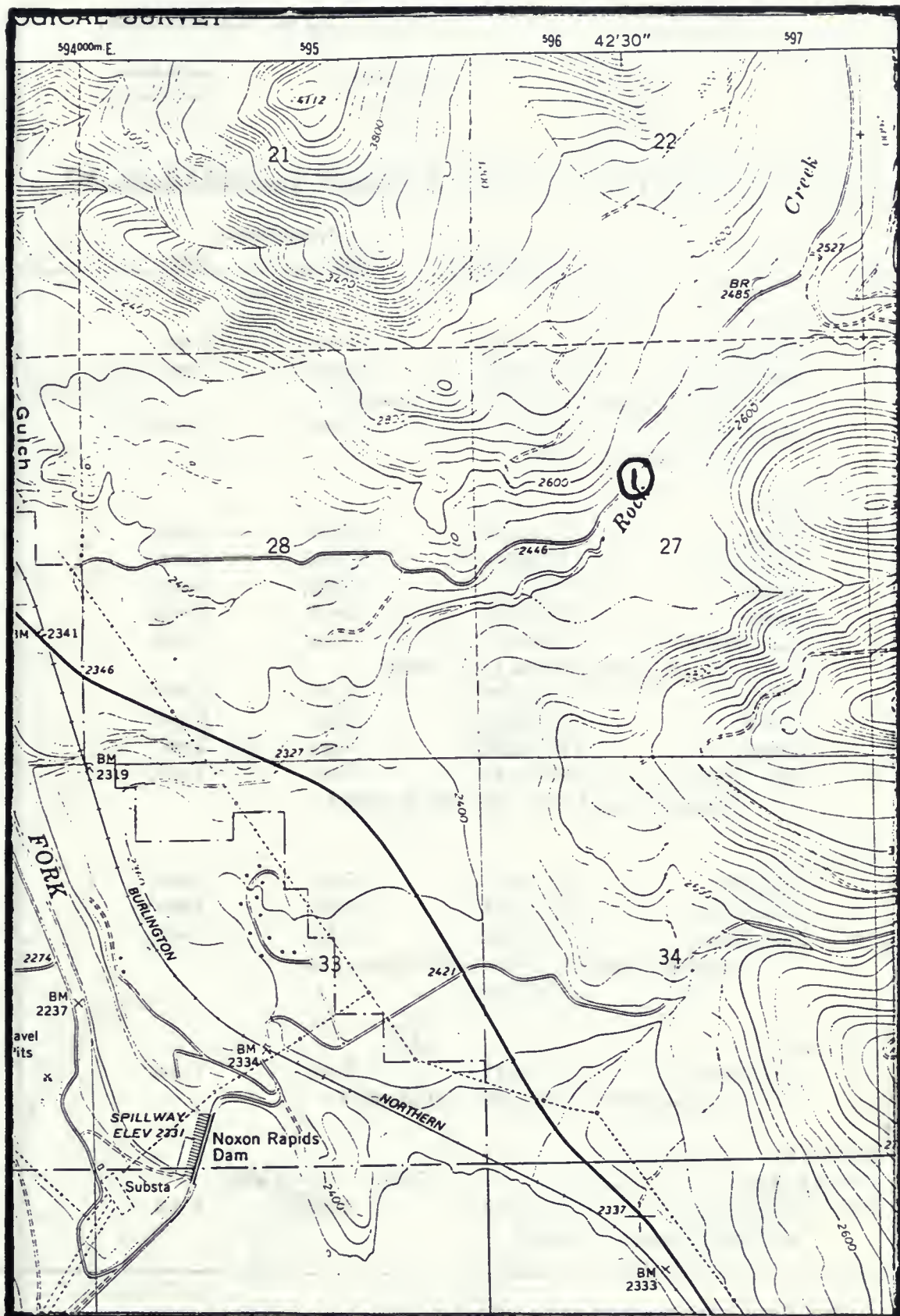
C = Circle	red = red	yel = yellow	wht = white
T = Triangle	grn = green	blk = black	ora = orange
S = Square	blu = blue		

ROCK CREEK, KOOTENAI NATIONAL FOREST, SANDERS CO., MT

Site	USFWS Band #	Nasal Discs	
		left	right
1) 31 July 93			
Adult Female	755-76097	T-yel	S-ora
Juvenile	755-76098	T-blk	S-grn
Juvenile	755-76099	T-grn	S-blu
Juvenile	755-76100	T-grn	T-yel
Juvenile	775-38603	S-ora	T-grn
2) 31 July 93			
Juvenile	775-38604	only pink band 70, right leg	
Juvenile	775-38605	only pink band 69, right leg	
no accompanying adult			



Rock Creek harlequin duck marking sites, 1993.
 Quad: Elephant Peak



Rock Creek harlequin duck marking sites, 1993.
 Quad: Noxon Rapids Dam

Appendix B (cont.)

Harlequin Duck marking outside Glacier National Park utilizing nasal discs and USFWS bands.

C = Circle
T = Triangle
S = Square

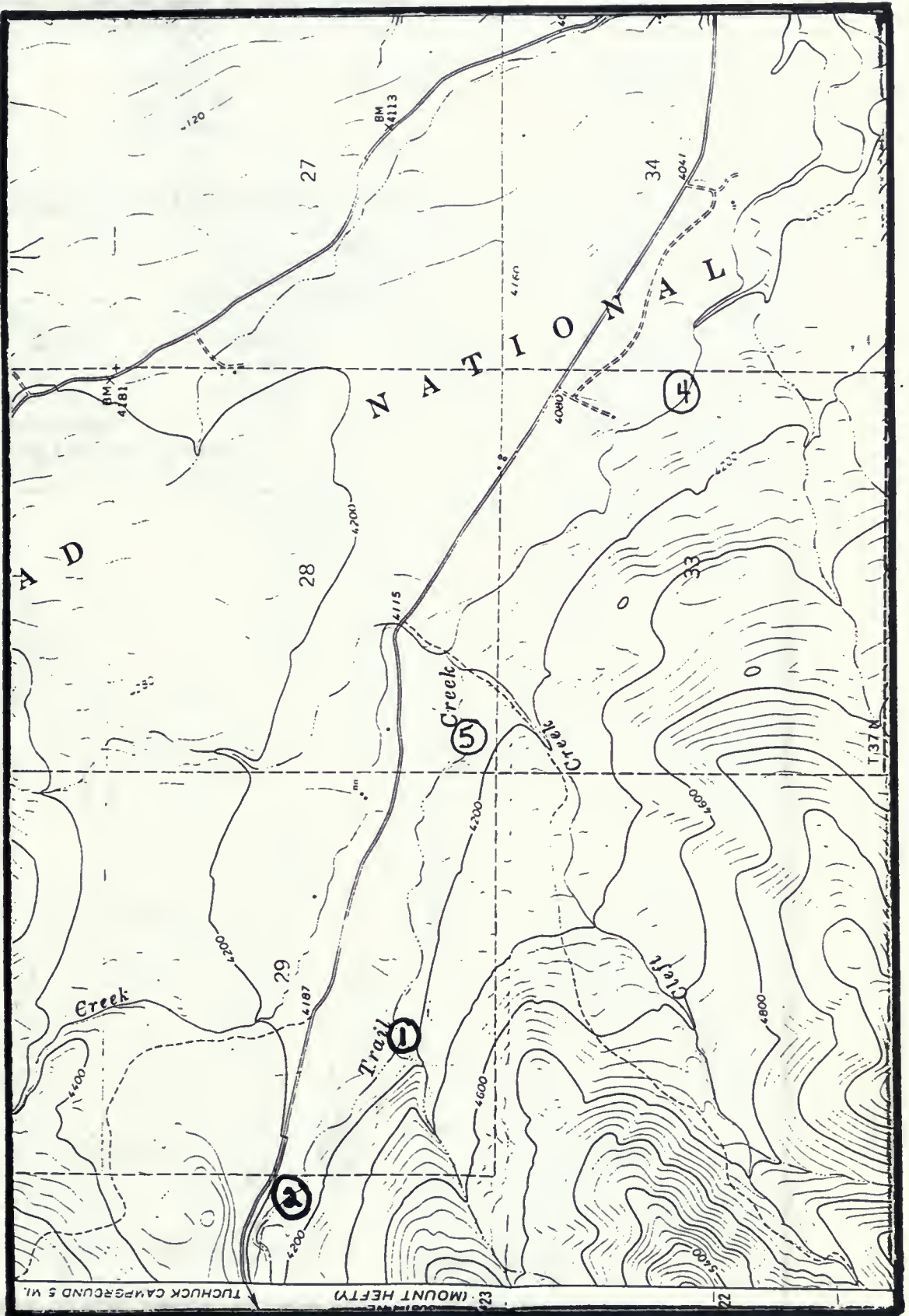
red = red
grn = green
blu = blue

yel = yellow
blk = black

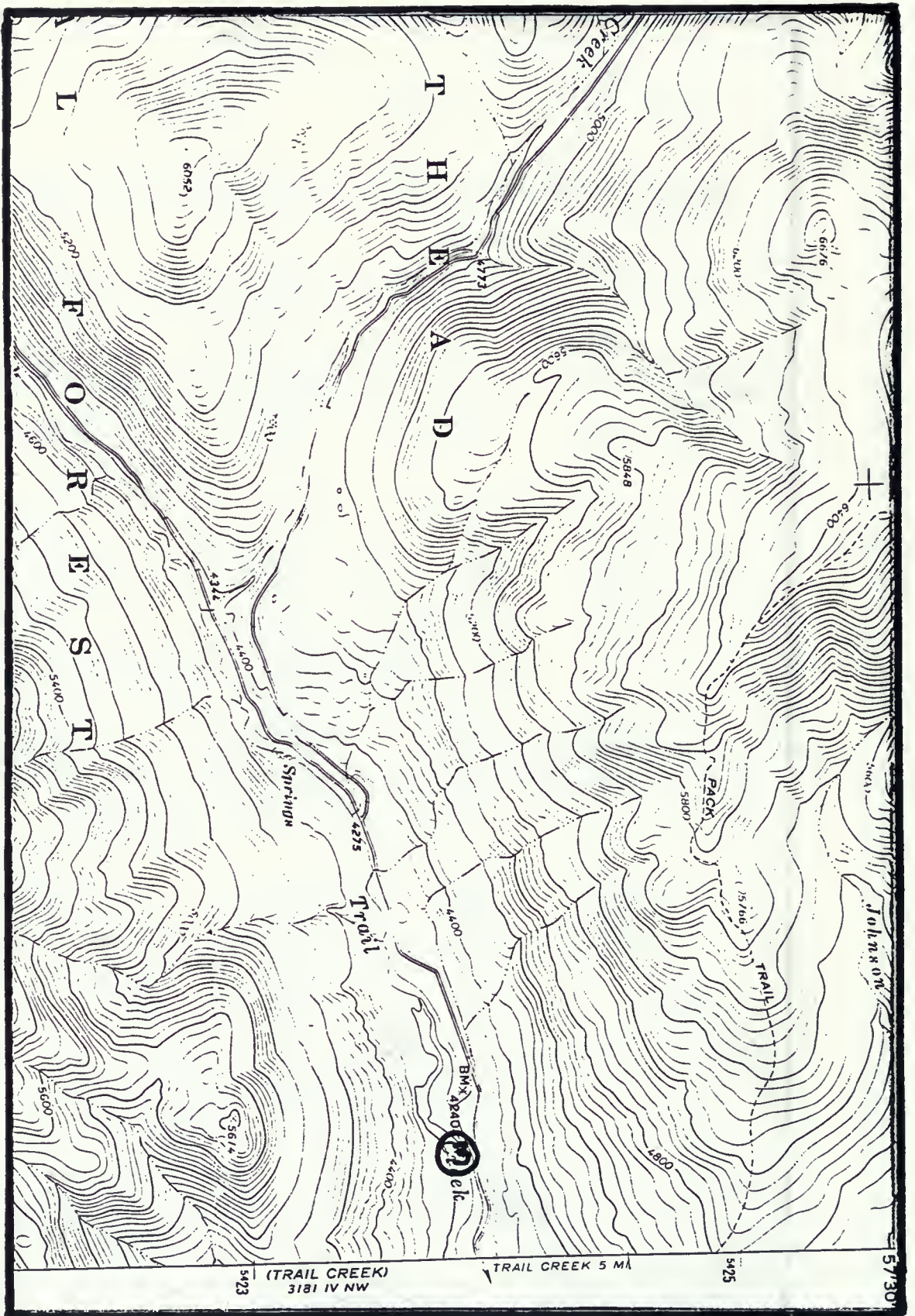
whi = white
ora = orange

TRAIL CREEK, FLATHEAD NATIONAL FOREST, FLATHEAD CO., MT

Site	USFWS Band #	Nasal Discs	
		left	right
1) 9 May 93			
Adult Male	755-76070	S-ora	T-grn
** Adult Female	755-76045	S-ora	T-grn
marked as adult 12 Aug 1992 with brood of 4			
Adult Male	755-76071	C-whi	C-whi
(with unmarked female)			
2) 13 Aug 93			
Juvenile	775-38613	C-grn	C-red
Juvenile	775-38614	C-whi	C-red
Juvenile	775-38615	S-blu	C-red
Juvenile	775-38616	S-red	C-whi
Adult Female	775-38617	C-whi	C-whi
(one additional unmarked juv in brood)			
Juvenile	775-38618	S-grn	C-blu
Juvenile	775-38619	C-blu	S-grn
Juvenile	775-38620	S-grn	T-yel
** Adult Female	755-76045	S-ora	T-grn
marked as adult 12 Aug 1992 with brood of 4			
3) 9 May 93			
Adult Male	755-76072	S-red	S-red
Adult Male	755-76073	S-blu	S-blu
** Adult Female	765-27566	C-blu	C-blu
marked as adult 10 Jun 1992 with different male: 765-27565			
4) 9 May 93			
** Adult Female	755-76045	S-ora	T-grn
marked as adult 12 Aug 1992 with brood of 4			
5) 9 May 93			
** Adult Male	765-27563	C-blu	C-blu
** Adult Female	765-27564	S-ora	S-ora
pair marked together 10 June 92			



Trail Creek harlequin duck marking sites, 1993.
 Quad: Trailcreek



Trail Creek harlequin marking sites, 1993.
 Quad: Mount Hefty

Appendix B (cont.)

Harlequin Duck marking outside Glacier National Park utilizing nasal discs and USFWS bands.

*C = Circle
T = Triangle
S = Square*

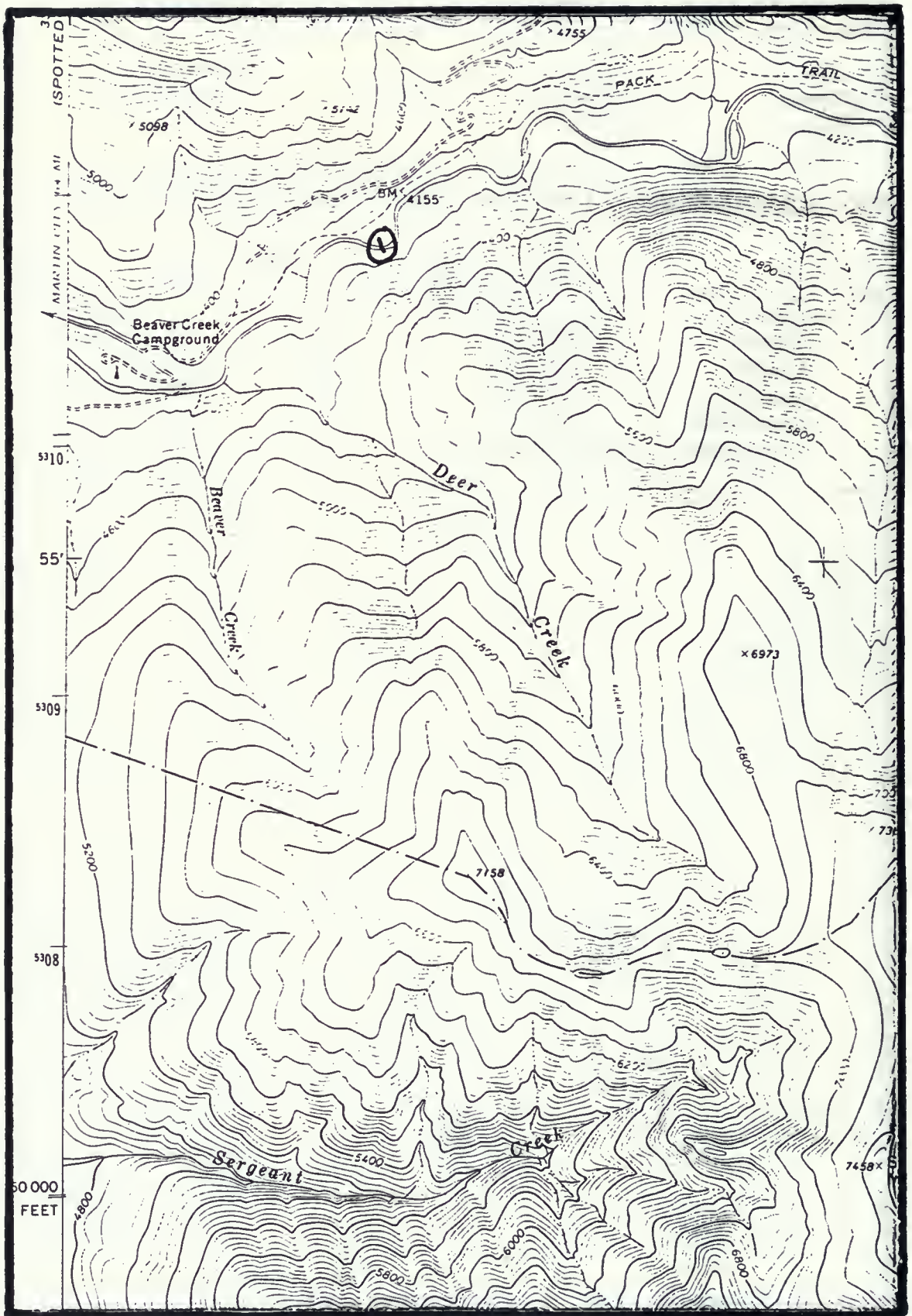
*red = red
grn = green
blu = blue*

*yel = yellow
blk = black*

*wht = white
ora = orange*

SPOTTED BEAR RIVER, FLATHEAD NATIONAL FOREST, FLATHEAD CO., MT

Site	USFWS Band #	Nasal Discs	
		left	right
1) 15 Aug 93			
Juvenile	775-38621	T-blk	C-whi
Juvenile	775-38622	S-blu	T-blk
Juvenile	775-38623	T-blk	C-blu
Adult female	925-09301	C-blu	T-yel
(one additional unmarked juv in brood)			



Spotted Bear River marking site, 1993.

QUAD: Whitcomb Peak

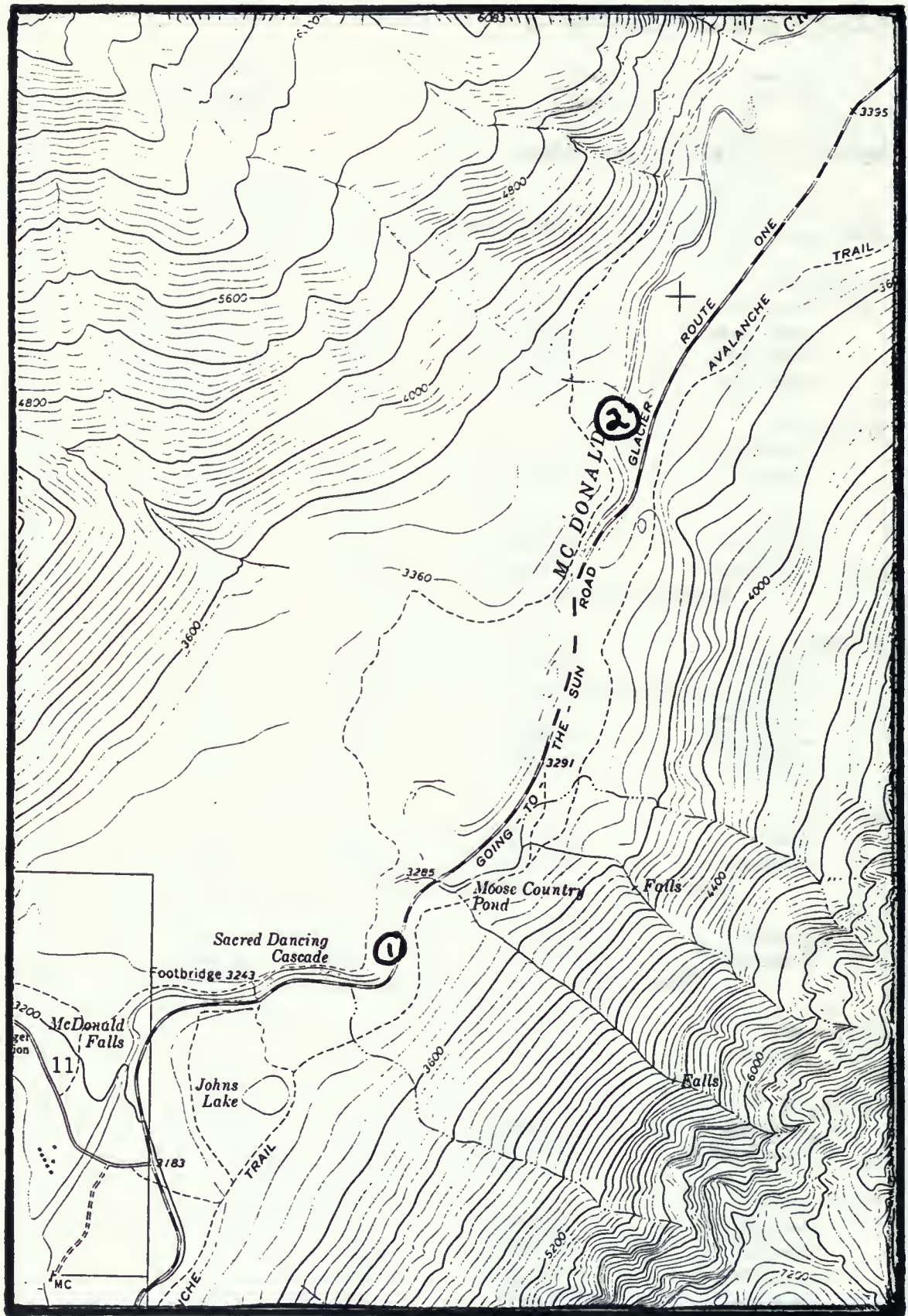
Appendix B (cont.)

Colored Leg Bands used in Glacier National Park (pink/USFWS for 1992 & 1993 juveniles)

g = green	w = white	p = pink	y = yellow
b = blue	o = orange	r = red	s = silver (FWS band)

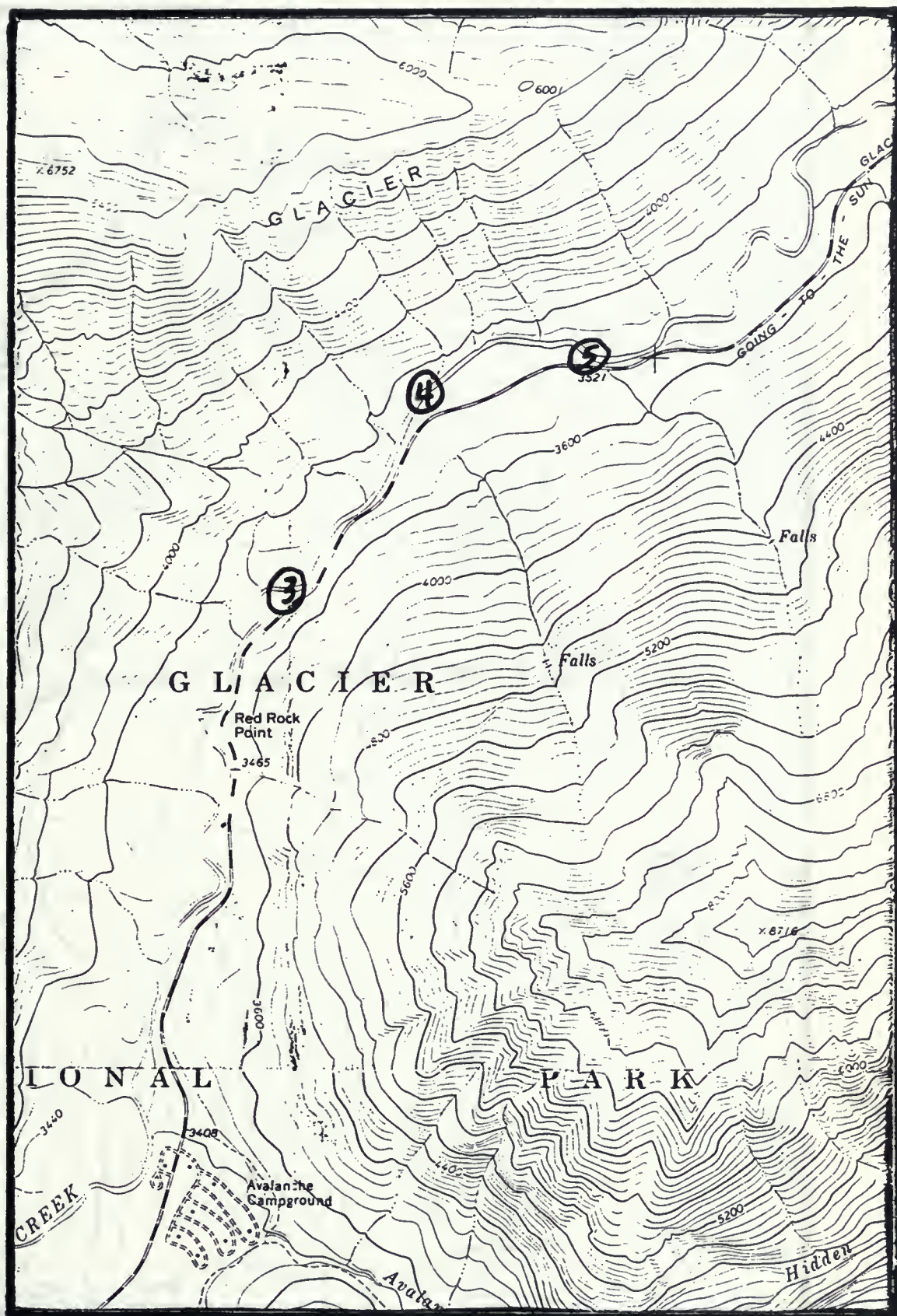
McDONALD CREEK (Glacier National Park)

Site	USFWS Band #	Plastic leg bands	
		left	right
1) 6 May 93			
Adult Male	755-76059	o/s	o/o
Adult Female	755-76060	o/s	o/o
Adult Male	755-76061	b/o	o/s
Adult Female	755-76062	b/o	o/s
2) 10 Aug 93			
Adult Female	765-27597	y/s	y/g
Juvenile	765-27598	g/y-2	p/s
Juvenile	765-27599	p/s	y/y-1
Juvenile	765-27600	b/y-3	p/s
** Adult Female	755-76033	y/s	y/g
recapture from 11 Aug 92; with brood of 2 in 1992			
3) 7 May 93			
Adult Male	755-76063	g/o	o/s
recaptured on Hornby Is. off Vancouver Island 4 Aug 93			
Adult Female	755-76064	g/o	o/s
Adult Female	755-76065	o/s	o/w
Adult Male	755-76066	o/s	o/w
4) 11 Aug 93			
Juvenile	775-38606	w/y-4	p/s
** Adult Female	755-76064	g/o	o/s
recapture from 7 May 1993; one additional chick was present but drown in the net			
Juvenile	775-38607	p/s	g/y-5
** Adult Female	765-27586	y/s	y/g
2 additional chicks were present but not captured; recapture from 11 Aug 92; with brood of 2 in 1992			
5) 7 May 93			
Adult Male	755-76067	w/o	o/s
6) 7 May 93			
Adult Male	755-76068	y/o	o/s
Adult Female	755-76069	y/o	o/s
7) 11 Aug 93			
Juvenile	775-38608	p/s	b/y-6
Juvenile	775-38609	p/s	w/y-7
Adult Female	775-38610	g/y	y/s
Juvenile	775-38611	p/s	y/w
Juvenile	775-38612	p/s	b/g



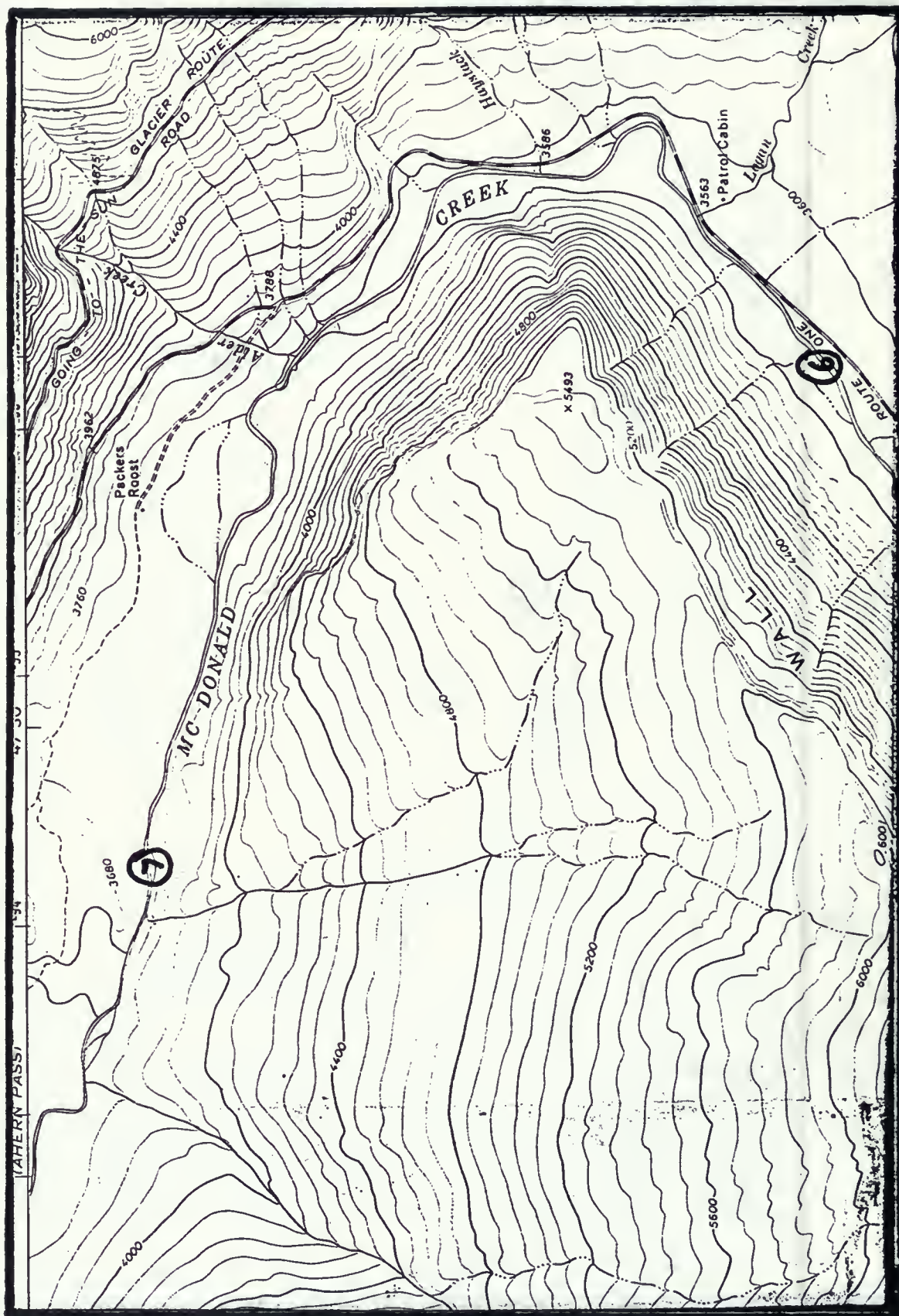
McDonald Creek harlequin duck marking sites, 1993.

Quad: Mount Cannon



McDonald Creek harlequin duck marking sites, 1993.

Quad: Mount Cannon

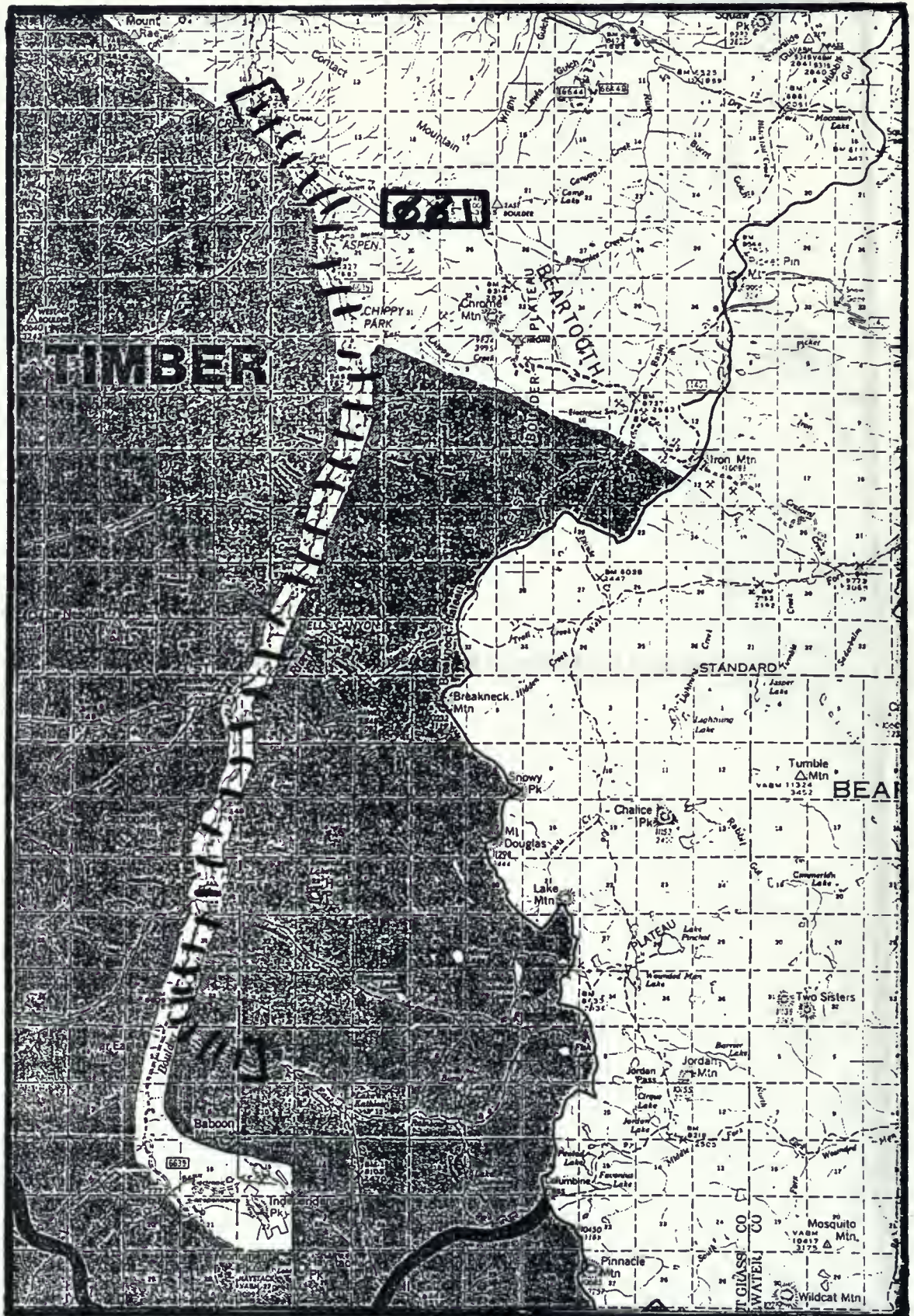


McDonald Creek harlequin duck marking sites, 1993.
 Quad: Mount Cannon

Appendix C. Element Occurrence Records from 1993 Surveys

Histrionicus histrionicus

Boulder River (001)



MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: HISTRIONICUS HISTRIONICUS
Common Name: HARLEQUIN DUCK

Global rank: G5 Forest Service status: SENSITIVE
State rank: S2B,SZN Federal Status: C2

Element occurrence code: ABNJB15010.001
Element occurrence type:

Survey site name: BOULDER RIVER
EO rank: C

EO rank comments: NOT SURE OF BOATING AND FISHING USE; IF BOTH ARE MODERATE TO HEAVY, T
RANK SHOULD BE D.

County: PARK
USGS quadrangle: MOUNT DOUGLAS
CHROME MOUNTAIN

Township: Range: Section: TRS comments:
006S 012E 04 SE4
Precision: G
Survey date: Elevation: 5200 - 7350
First observation: 1979 Slope/aspect:
Last observation: 1993-07-22 Size (acres): 0

Location:
FROM BIG TIMBER, MT, DRIVE SOUTH AND WEST 25 MILES ALONG THE MAIN
BOULDER RIVER TO THE NAT'L FOREST BOUNDARY, THENCE ANOTHER 17 MILES TO
HILLEARY BRIDGE, JUST S. OF FOURMILE CR.

Element occurrence data:
CA. 5-6 PAIRS OBSERVED EACH SPRING, BUT GENERALLY ONLY ONE OR TWO (OR
NO) BROODS REPORTED LATER IN SUMMER. MOST OBSERVATIONS FROM FOURMILE -
HICKS PARK SECTION. (SPECIFIC OBSERVATION DATA ON FILE AT MTNHP.)

General site description:
A CA. 20 MILE SEGMENT OF MOUNTAIN STREAM, FROM THE EAST FORK ABOVE BOX
CANYON STATION DOWN TO FALLS CREEK.

Land owner/manager:
GALLATIN NATIONAL FOREST, BIG TIMBER RANGER DISTRICT

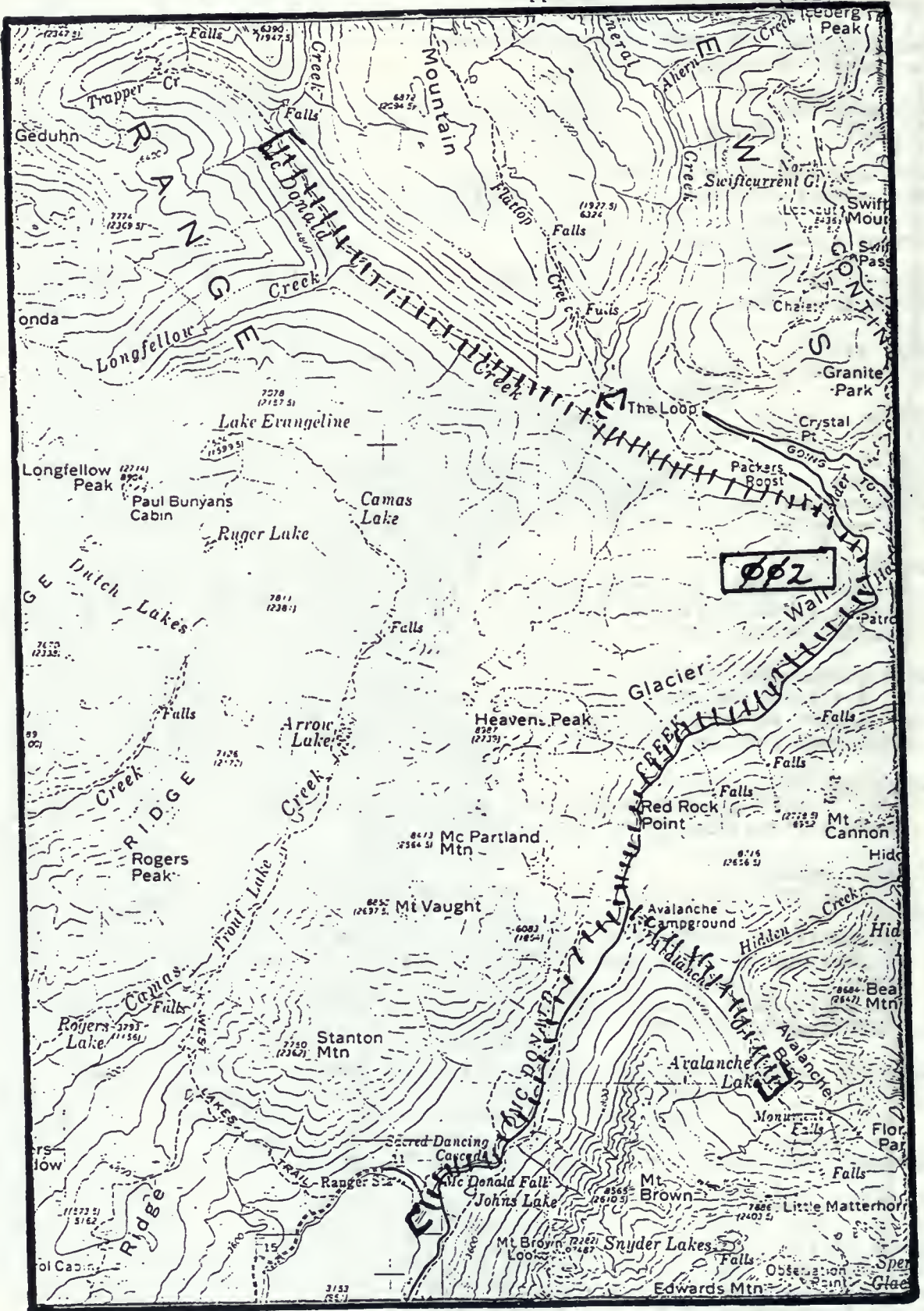
Comments:
OBSERVATIONS FROM 1979 TO 1986 BY EDITH YAPERNCICH, BILLINGS, MT, IN
VICINITY OF HILLEARY BRIDGE. IN 1990: ANN HOPKINS REPORTS 8 BIRDS
(FEMALE + 7 YOUNG?) AT HICKS PARK C.G. SOME SURVEYS DONE ON MAIN STEM
AND EAST & WEST FORKS IN EARLY 1990s. TRUE EXTENT OF OCCUPIED BREEDING
HABITAT STILL UNKNOWN.

Information source: ZOOLOGIST, MONTANA NATURAL HERITAGE PROGRAM, 1515
EAST SIXTH AVENUE, P.O. BOX 210800, HELENA, MT
59620-1800. 406/444-3009.

Specimens: ENG, R.L. (S.N.). 26 MAY 1983. SPECIMEN #6733. MONT.

Observation summary:

Observer/date	Location:	Observation:
1993-05-30, FOX	FOURMILE C.G.	PAIR
1993-06-12, CASTREN	T06SR12E, S4	5 MALES
1993-06-13, CASTREN	T06SR12E, S16	1 MALE
1993-06-14, CASTREN	WEST BOULDER RIVER	NONE
1993-07-22, CASTREN	HICKS PARK C.G.	HEN + 1 JUV.



Scientific Name: HISTRIONICUS HISTRIONICUS
Common Name: HARLEQUIN DUCK

Global rank: G5 Forest Service status: SENSITIVE
State rank: S2B,SZN Federal Status: C2

Element occurrence code: ABNJB15010.002
Element occurrence type:

Survey site name: UPPER MCDONALD CREEK
EO rank: A/B
EO rank comments: 11-14 PAIRS PRESENT ON MCDONALD CREEK BELOW LOGAN
CREEK; PERHAPS 20 PAIRS IN ENTIRE COMPLEX. WHILE
AREA IS NOT DIFFICULT ACCESS OR REMOTE, DUCKS HAVE
ADAPTED TO VISITORS AND SOME AREAS HAVE DIFFICULT ACCESS.

County: FLATHEAD

USGS quadrangle: MOUNT CANNON
AHERN PASS
MOUNT GEDUHN

Township: Range: Section: TRS comments:
034N 017W 27 NW4

Precision: M
Survey date: Elevation: 3153 - 4200
First observation: 1973 Slope/aspect:
Last observation: 1992-09-02 Size (acres): 60

Location:
UPPER MCDONALD CREEK IN GLACIER NP; STREAM SECTION FROM CONTINENTAL
CREEK SW TO THE NORTH END OF LAKE MCDONALD, AND INCLUDING MINERAL
CREEK, AVALANCHE CREEK AND AVALANCHE LAKE.

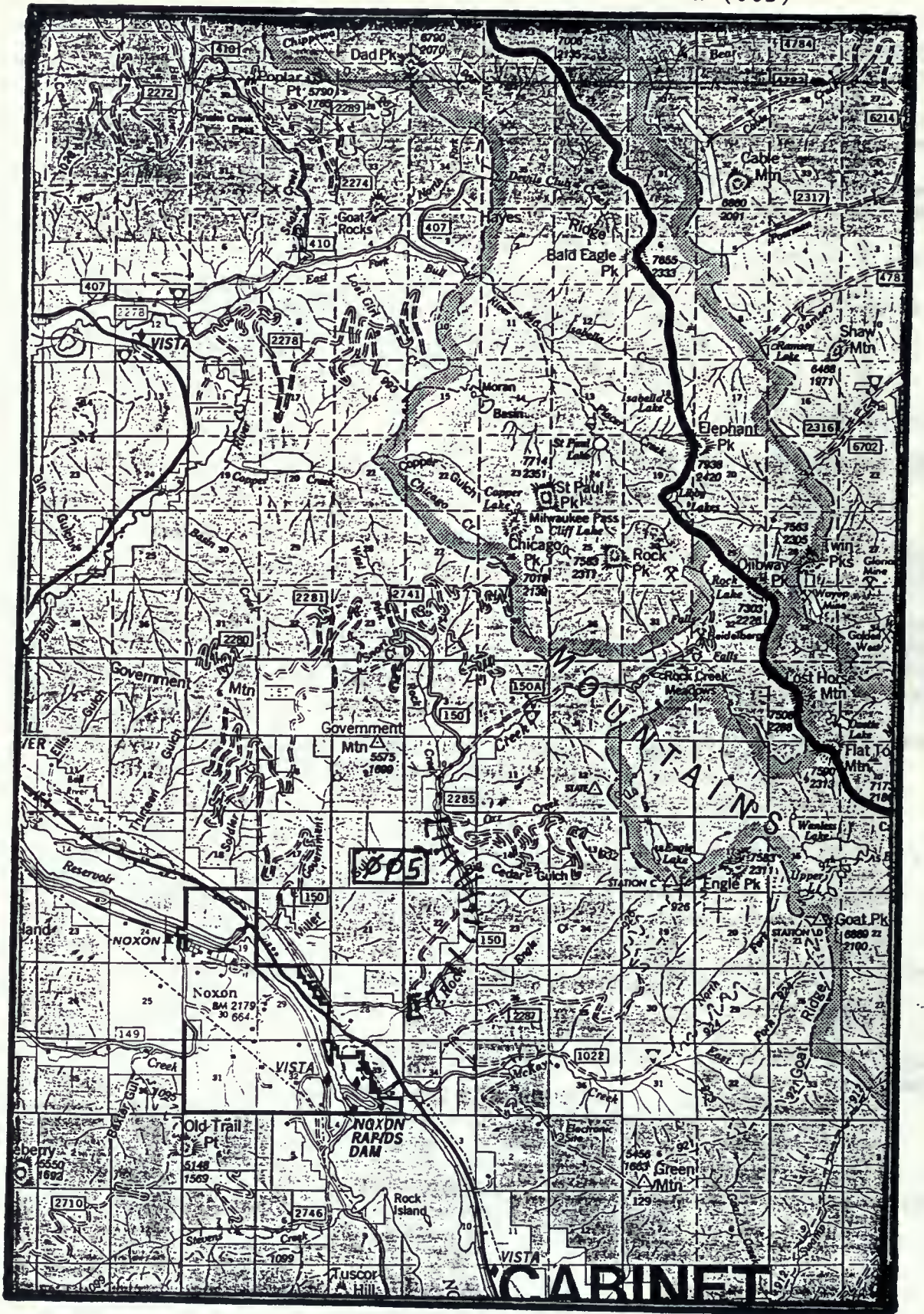
Element occurrence data:
PERHAPS 20 PAIRS PRESENT EACH SPRING, WITH CA. 10 BROODS REPORTED EACH
SUMMER. A WELL-SURVEYED POPULATION, WITH MANY DUCKS BANDED IN THE
EARLY 1990s. (SPECIFIC OBSERVATION DATA ON FILE AT MTNHP.)

General site description:
CA. 20 MILES OF MOUNTAIN STREAM ON MACDONALD CREEK AND ITS
TRIBUTARIES.

Land owner/manager: GLACIER NATIONAL PARK
Comments:

EXTENT OF OCCUPIED BREEDING HABITAT UNKNOWN. SPRING PAIRS AND LATE
SEASON YOUNG REPORTED ON LOWER MCDONALD CREEK, FISH CREEK, ETC., MAY
OR MAY NOT BE BIRDS FROM UPPER MCDONALD CREEK POPULATION.

Information source: ZOOLOGIST, MONTANA NATURAL HERITAGE PROGRAM, 1515
EAST SIXTH AVENUE, P.O. BOX 210800, HELENA, MT
59620-1800. 406/444-3009.



MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: HISTRIONICUS HISTRIONICUS
Common Name: HARLEQUIN DUCK

Global rank: G5 Forest Service status: SENSITIVE
State rank: S2B,SZN Federal Status: C2

Element occurrence code: ABNJB15010.005
Element occurrence type:

Survey site name: ROCK CREEK (NOXON)
EO rank: D
EO rank comments: 2 PAIRS PRESENT IN 1993, FEWER IN PREVIOUS YEARS.
3-4 OTHER STREAMS WITHIN 20 KM WITH TOTAL OF 9-12
PAIRS; ACCESS DIFFICULT, NO BOATING AND LITTLE
FISHING.

County: SANDERS

USGS quadrangle: NOXON RAPIDS DAM
ELEPHANT PEAK

Township: Range: Section: TRS comments:
026N 032W 27 15,22

Precision: M
Survey date: Elevation: 2400 - 2680
First observation: 1986 Slope/aspect:
Last observation: 1993-07-31 Size (acres): 0

Location:
ABOUT 1.5 AIR MILES NE OF NOXON RAPIDS DAM, WHERE FOREST SERVICE ROAD
#150 FIRST INTERSECTS ROCK CREEK.

Element occurrence data:
SPORADIC SIGHTINGS SINCE 1986; PROBABLY 1 OR 2 BROODS GENERALLY
PRODUCED EACH YEAR. (SPECIFIC OBSERVATION DATA ON FILE AT MTNHP.)

General site description:
A CA. 3 MILE STRETCH OF MOUNTAIN STREAM, EXTENDING UPSTREAM FROM
MAPPED LOCATION.

Land owner/manager:
KOOTENAI NATIONAL FOREST, CABINET RANGER DISTRICT
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Comments:
FISH TRAP PLACED BY MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS.

Information source: WILDLIFE BIOLOGIST, KOOTENAI NATIONAL FOREST, 506
US HWY 2 WEST, LIBBY, MT 59923.

EcoMonitoring

Name: HISTRIONICUS HISTRIONICUS
Common name: HARLEQUIN DUCK

Reference code: EM.USMTHP * 23 Survey site: ROCK CREEK (NOXON)
Goals & Objectives:

Management plan: Monitoring plan:
Monitoring level:

Management goals:
Monitoring goals: TRACK CHANGES IN THE POPULATION AND REPRODUCTIVE SUCCESS;
 DETERMINE SITE FIDELITY.

Parameter:	Threshold note:
SINGLE MALES	1
SINGLE FEMALES	1
PAIRS	1
JUVENILES	1
BROODS	0

Methods: VISUAL SURVEYS, WALKING LENGTH OF EO UPSTREAM (IF POSSIBLE).

Sampling frequency: MINIMUM TWICE PER YEAR, CA. MAY & JULY/AUGUST.

Visit dates: 1993-07-31
Coordinator: REICHEL, JIM

Trends & Recommendations:

Short-term trend: UNKNOWN Long-term trend: UNKNOWN
Interpretation:

Current condition: UNKNOWN
Comments:

Management recommendations:

Monitoring recommendations:

Ecomonitoring Visits

Reference: EM.USMTHP * 23 * 1

Survey site: ROCK CREEK
(NOXON)

Start date: 1993-07-31

Observer: REICHEL
BECKSTROM

Person hours: 11.00

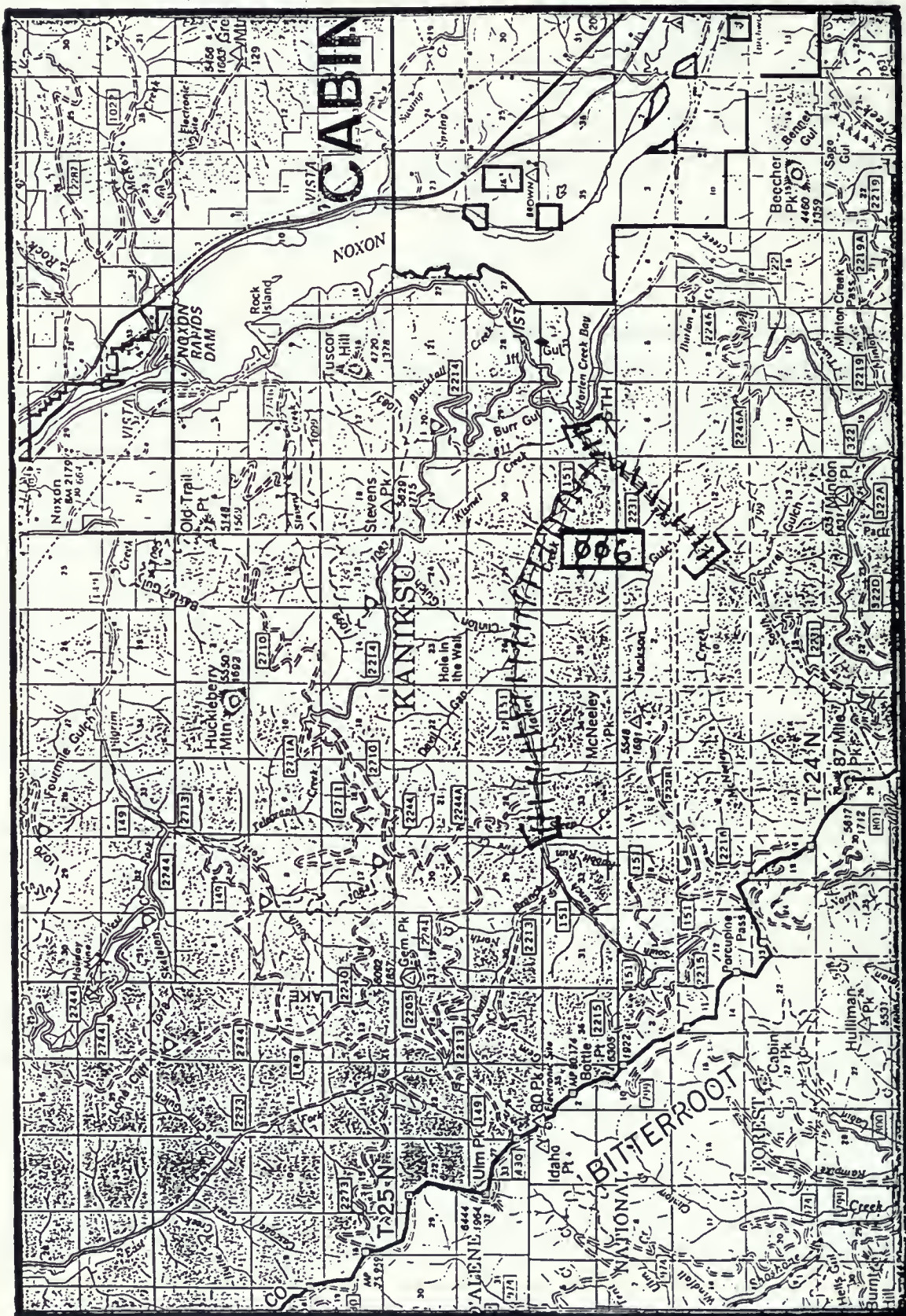
Effort: HWY 200 UP TO SECTION 10/11 LINE.

Parameter:	Quantitative summary:	Quality note:
SINGLE MALES	0	
SINGLE FEMALES	1, 1 BANDED	.45 MI BELOW 1ST BRIDGE
PAIRS	0	
JUVENILES	6, 6 BANDED	ABOVE + 1 MI ABOVE BRIDGE
BROODS	2	

Other observations: BROODS IN SE4NW4 S27, AND SE4SE4 S15.

Histrionicus histrionicus

Marten Creek (006)



MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: HISTRIONICUS HISTRIONICUS
Common Name: HARLEQUIN DUCK

Global rank: G5 Forest Service status: SENSITIVE
State rank: S2B, SZN Federal Status: C2

Element occurrence code: ABNJB15010.006
Element occurrence type:

Survey site name: MARTEN CREEK
EO rank: C/B
EO rank comments: 5 PAIRS PRESENT IN 1993, FEWER IN PREVIOUS YEARS.
3-4 OTHER STREAMS WITHIN 20 KM WITH TOTAL OF
9-12 PAIRS; NO BOATING, LITTLE FISHING.

County: SANDERS

USGS quadrangle: NOXON
BLOOM PEAK

Township:	Range:	Section:	TRS comments:
025N	032W	32	ADDITIONAL SECTIONS
Precision: M			
Survey date:			Elevation: 2330 - 2850
First observation: 1986			Slope/aspect:
Last observation: 1993-07-29			Size (acres): 0

Location:

THE SOUTH AND NORTH FORKS OF MARTEN CREEK ARE ON THE WEST SIDE OF
NOXON RESERVOIR, CA. 8 MILES NW OF TROUT CREEK.

Element occurrence data:

GENERALLY 2 TO 4 PAIRS BREED. (SPECIFIC OBSERVATION DATA ON FILE AT
MTNHP.)

General site description:

MOUTH OF MARTEN CREEK IS MAPPED. THIS EO INCLUDES THE NORTH BRANCH
(CA. 5 MILES) AND SOUTH BRANCH (CA. 1.5 MILES) AS CONTIGUOUS HABITAT.

Land owner/manager:

KOOTENAI NATIONAL FOREST, CABINET RANGER DISTRICT
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Comments:

Information source: REICHEL, JAMES D. [ZOOLOGIST] MONTANA NATURAL
HERITAGE PROGRAM, 1515 EAST SIXTH AVENUE, P.O. BOX
201800, HELENA, MT 59620-1800. WORK: (406)
444-3009.

EcoMonitoring

Name: HISTRIONICUS HISTRIONICUS

Common name: HARLEQUIN DUCK

Reference code: EM.USMTHP2 * 1

Survey site: MARTEN CREEK

Goals & Objectives:

Management plan: Monitoring plan: Y Monitoring level: 2

Management goals:

Monitoring goals: TRACK CHANGES IN THE POPULATION AND REPRODUCTIVE SUCCESS;
DETERMINE SITE FIDELITY.

Parameter: Threshold note:

SINGLE MALES 1

SINGLE FEMALES 1

PAIRS 1

JUVENILES 1

BROODS 1

Methods: VISUAL SURVEYS, WALKING LENGTH OF EO UPSTREAM (IF POSSIBLE).

Sampling frequency: MINIMUM TWICE PER YEAR, CA. MAY & JULY/AUGUST.

Visit dates: 1987-06-18

1987-06-22

1988-06-18

1989

1993-06-02

1993-06-02

1993-07-29

1993-07-29

1992-05-12

1992-06-01

1992-08-04

Coordinator: REICHEL, JIM

Trends & Recommendations:

Short-term trend: STABLE

Long-term trend:

Interpretation: POPULATION APPEARS STABLE OVER LAST 5 YEARS.

Current condition: SATISFACTORY

Comments: CURRENT POPULATION SEEMS TO BE MAXIMUM THAT HABITAT CAN
SUPPORT.

Management recommendations:

Monitoring recommendations:

Ecomonitoring Visits

Reference: EM.USMTHP2 * 1 * 4

Survey site: MARTEN CREEK

Start date: 1993-06-02

Observer: CASTREN
BECKSTROM
REICHEL

Person hours: 6.00

Effort: STAN DID LOWER 1.5 MI OF S.FK.; ALL DID N.FK. FROM 1 MILE
ABOVE DEVILS GAP TO BAY.

Parameter:	Quantitative summary:	Quality note:
SINGLE MALES	5	2 LOCATIONS
SINGLE FEMALES	0	
PAIRS	1, FEMALE BANDED	.3 MI UP N.FK. FROM JCT
JUVENILES	0	
BROODS	0	

Other observations: SINGLE MALES JUST UP S.FK. AND JUST BELOW JUNCTION.

Ecomonitoring Visits

Reference: EM.USMTHP2 * 1 * 5

Survey site: MARTEN CREEK

Start date: 1993-07-29

Observer:	JOHNSON, W.	CASTREN
	PFALZER, E.	REICHEL
	HIDY, T.	BECKSTROM

Person hours: 8.00

Effort: S.FK. TO MCNEELEY CREEK; N.FK. TO DEVILS GAP.

Parameter:	Quantitative summary:	Quality note:
SINGLE MALES	0	
SINGLE FEMALES	2, BOTH BANDED	
PAIRS	0	
JUVENILES	8, ALL BANDED	MOUTH OF BAY
BROODS	2	

Other observations: TWO BROODS, EACH WITH 4 JUV., AT OR NEAR MOUTH OF BAY.
ONE HEN WAS ALREADY BANDED; OTHERS BANDED TODAY.

Ecomonitoring Visits

Reference: EM.USMTHP2 * 1 * 11

Survey site: MARTEN CREEK

Start date: 1992 05 12

Observer: GENTER, DAVID

Person hours: 2.50

Effort: SURVEYED SOUTH FORK UP TO SORREL GULCH.

Parameter:	Quantitative summary:	Quality note:
SINGLE MALES	2	
SINGLE FEMALES	0	
PAIRS	2	
JUVENILES		
BROODS		

Other observations: RECAPTURED MALE #27560 (BANDED IN 1991). BANDED MALE #27561.

Ecomonitoring Visits

Reference: EM.USMTHP2 * 1 * 12

Survey site: MARTEN CREEK

Start date: 1992 06 01

Observer: REICHEL, JIM, et al.

Person hours: 2.00

Effort: SPOT SURVEYED CA. LOWER MILE OF NORTH FORK; WALKED UPSTREAM
LOWER MILE OF SOUTH FORK.

Parameter:	Quantitative summary:	Quality note:
SINGLE MALES		
SINGLE FEMALES		
PAIRS		
JUVENILES		
BROODS		

Other observations: NO DUCKS OBSERVED.

Ecomonitoring Visits

Reference: EM.USMTHP2 * 1 * 13

Survey site: MARTEN CREEK

Start date: 1992 08 04

Observer: REICHEL, JIM; BECKSTROM, STAN

Person hours: 20.00

Effort: SURVEYED NORTH FORK UP TO CLINTON GULCH; LOWER MILE OF SOUTH FORK (STREAMS INTERMITTENT ABOVE THOSE POINTS). MOST TIME SPENT BANDING - 12 BIRDS FIRST DAY AND 3 BIRDS SECOND DAY.

Parameter:	Quantitative summary:	Quality note:
SINGLE MALES	0	
SINGLE FEMALES	5	SINGLE FEMALE IN BAY
PAIRS	0	
JUVENILES	13	
BROODS	4	BROODS OF 4,4,4,1

Other observations: BROODS LOCATED AT: MOUTH OF MARTEN CREEK (2); CA. 200m UP FROM MOUTH; Sec.25 SW4SE4.

Ecomonitoring Visits

Reference: EM.USMTHP2 * 1 * 05

Survey site: MARTEN CREEK

Start date: 1989

Observer:

Person hours:

Effort:

Parameter:

Quantitative summary:

Quality note:

SINGLE MALES

0

SINGLE FEMALES

2

PAIRS

0

JUVENILES

?

BROODS

2

ON NORTH FORK

Other observations:

Ecomonitoring Visits

Reference: EM.USMTHP2 * 1 * 04

Survey site: MARTEN CREEK

Start date: 1988-06-18

Observer:

Person hours:

Effort:

Parameter:

Quantitative summary:

Quality note:

SINGLE MALES

?

SINGLE FEMALES

1 + ?

PAIRS

?

JUVENILES

6

BROODS

1

NEAR DEVILS GAP

Other observations: OTHER ADULTS OBSERVED, BUT DETAILS MISSING.

Ecomonitoring Visits

Reference: EM.USMTHP2 * 1 * 02

Survey site: MARTEN CREEK

Start date: 1987-06-18

Observer: ASH, E. & CROWE, E.

Person hours:

Effort: NORTH FORK SURVEY.

Parameter:	Quantitative summary:	Quality note:
SINGLE MALES	0	
SINGLE FEMALES	6	
PAIRS	0	
JUVENILES	?	
BROODS	3	

Other observations:

Ecomonitoring Visits

Reference: EM.USMTHP2 * 1 * 03

Survey site: MARTEN CREEK

Start date: 1987-06-22

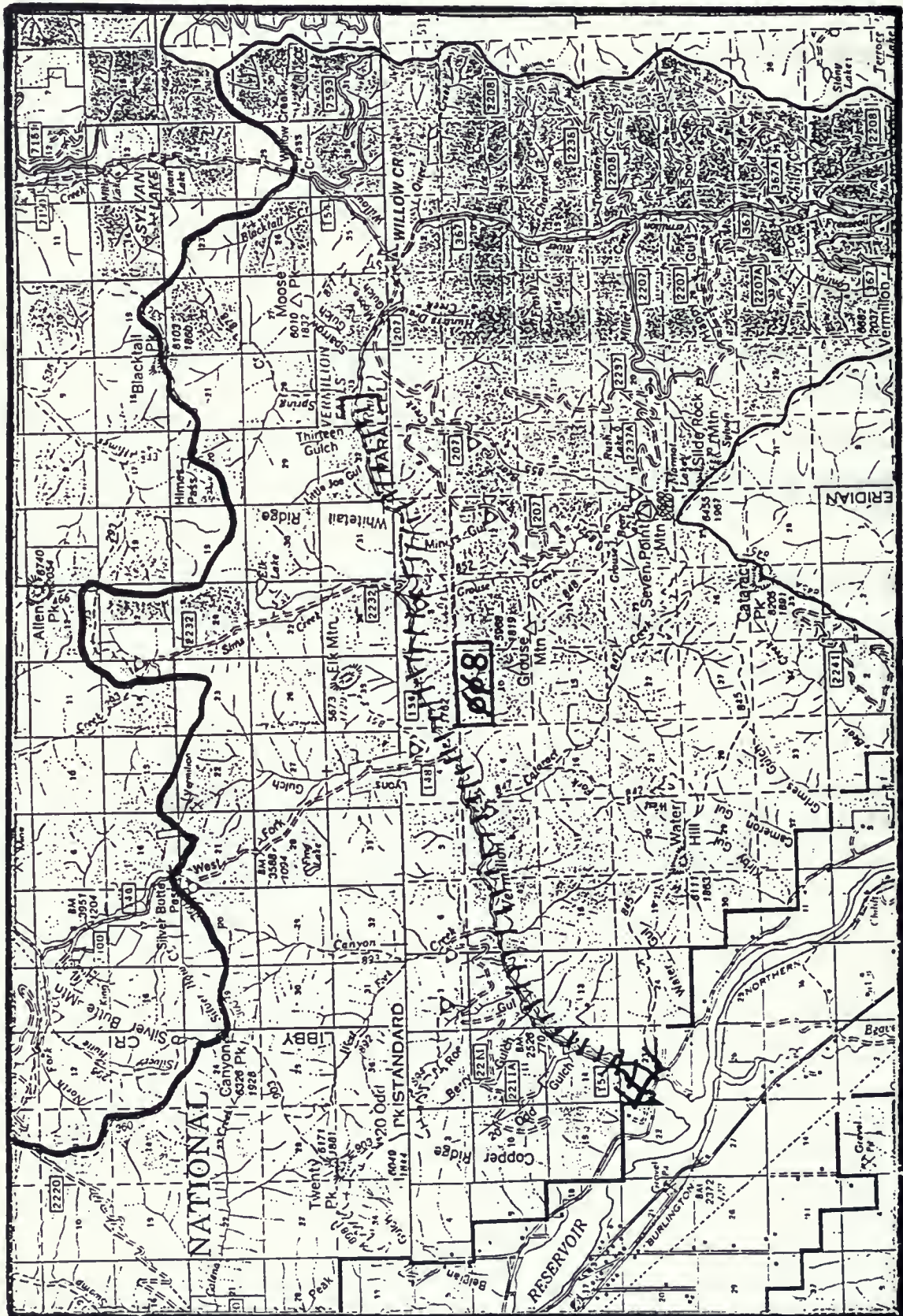
Observer: ASH, E. & CROWE, E.

Person hours:

Effort: SOUTH FORK SURVEY.

Parameter:	Quantitative summary:	Quality note:
SINGLE MALES	0	
SINGLE FEMALES	3	
PAIRS	0	
JUVENILES	?	
BROODS	2	

Other observations: MAY BE DUPLICATION OF BROODS OBSERVED ON NORTH FORK ON 6/18.



MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: HISTRIONICUS HISTRIONICUS
Common Name: HARLEQUIN DUCK

Global rank: G5 Forest Service status: SENSITIVE
State rank: S2B,SZN Federal Status: C2

Element occurrence code: ABNJB15010.008
Element occurrence type:

Survey site name: VERMILION RIVER
EO rank: D/C
EO rank comments: 3 PAIRS PRESENT IN 1993, FEWER IN PREVIOUS YEARS.
3-4 OTHER STREAMS WITHIN 20 KM WITH TOTAL OF
9-12 PAIRS; LITTLE BOATING OR FISHING; 1/2 WITH
DIFFICULT ACCESS.

County: SANDERS

USGS quadrangle: TROUT CREEK
SEVEN POINT MOUNTAIN
VERMILLION PEAK
MILLER LAKE

Township: Range: Section: TRS comments:
024N 031W 12 SW4

Precision: M
Survey date: Elevation: 2340 - 3400
First observation: 1988 Slope/aspect:
Last observation: 1992-06-01 Size (acres): 0

Location:
FROM TROUT CREEK GO NORTH 1.5 MILES ON SR 200, RIGHT 5 MILES ON THE
BLUE SLIDE ROAD, THEN LEFT 2 MILES UP THE VERMILLION RIVER ROAD.

Element occurrence data:
1988: HEN WITH 3 YOUNG OBSERVED. 1989: 2 FEMALES WITH BROODS OBSERVED,
ONE IN MAPPED LOCATION, ONE IN T24N,R30W,8 (SEVERAL MILES UPSTREAM).
1992: OBSERVED SINGLE MALE [T24N,R30W,2] AND SINGLE FEMALE
[T24N,R30W,7]; MALE WAS MARKED.

General site description:
A CA. 10 MILE STREAM SEGMENT, FROM VERMILLION BAY TO VERMILLION FALLS.

Land owner/manager:
KOOTENAI NATIONAL FOREST, CABINET RANGER DISTRICT
PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)
CORPORATE TIMBERLANDS

Comments:
PLACER MINING IN AREA. EXTENT OF OCCUPIED BREEDING HABITAT UNKNOWN.

Information source: MILLER, VERNON E. (GENE). 850, HIGHWAY 200 WEST,
PLAINS, MT 59859.

EcoMonitoring

Name: HISTRIONICUS HISTRIONICUS
Common name: HARLEQUIN DUCK

Reference code: EM.USMTHP * 28 Survey site: VERMILION RIVER

Goals & Objectives:

Management plan: Monitoring plan: Monitoring level:
Management goals:

Monitoring goals: TRACK CHANGES IN THE POPULATION AND REPRODUCTIVE SUCCESS;
DETERMINE SITE FIDELITY.

Parameter:	Threshold note:
SINGLE MALES	1
SINGLE FEMALES	1
PAIRS	1
JUVENILES	1
BROODS	0

Methods: VISUAL SURVEYS, WALKING LENGTH OF EO UPSTREAM (IF POSSIBLE).

Sampling frequency: MINIMUM TWICE PER YEAR, CA: MAY & JULY/AUGUST.

Visit dates: 1993-05-12
1993-05-27
1993-07-27
1993-07-28
1993-08-01

Coordinator: REICHEL, JIM

Trends & Recommendations:

Short-term trend: UNKNOWN Long-term trend: UNKNOWN
Interpretation:

Current condition: UNKNOWN
Comments:

Management recommendations:

Monitoring recommendations:

Ecomonitoring Visits

Reference: EM.USMTHP * 28 * 1

Survey site: VERMILION RIVER

Start date: 1993-05-12

Observer: REICHEL, et al

Person hours: 8.00

Effort: FROM MOUTH TO ABOVE MILLER CREEK.

Parameter:	Quantitative summary:	Quality note:
SINGLE MALES	1	BETWEEN LYONS & CATARACT
SINGLE FEMALES	0	
PAIRS	2	ONE AS ABOVE; OTHER BY MILLER
JUVENILES	0	
BROODS	0	

Other observations: RIVER VERY HIGH.

Ecomonitoring Visits

Reference: EM.USMTHP * 28 * 2

Survey site: VERMILION RIVER

Start date: 1993-05-27

Observer: CASTREN

Person hours: 5.00

Effort: .5 MI ABOVE SIMS CREEK DOWN TO MOUTH.

Parameter:	Quantitative summary:	Quality note:
SINGLE MALES	0	
SINGLE FEMALES	0	
PAIRS	1	SIMS CREEK
JUVENILES	0	
BROODS	0	

Other observations:

Ecomonitoring Visits

Reference: EM.USMTHP * 28 * 3

Survey site: VERMILION RIVER

Start date: 1993-07-27

Observer: REICHEL
BECKSTROM

Person hours: 4.00

Effort: MOUTH TO LOWER CANYON

Parameter:	Quantitative summary:	Quality note:
SINGLE MALES	0	
SINGLE FEMALES	0	
PAIRS	0	
JUVENILES	1, BANDED	ROE GULCH
BROODS		

Other observations: NOT QUITE ABLE TO FLY.

Ecomonitoring Visits

Reference: EM.USMTHP * 28 * 4

Survey site: VERMILION RIVER

Start date: 1993-07-28

Observer: REICHEL
BECKSTROM

Person hours: 12.00

Effort: LOWER CANYON TO DIVIDE CREEK.

Parameter:	Quantitative summary:	Quality note:
SINGLE MALES	0	
SINGLE FEMALES	2, 2 BANDED	
PAIRS	0	
JUVENILES	6, 6 BANDED	
BROODS	2	

Other observations: FEMALE WITH 4 JUV. AT TOP OF LOWER CANYON; FEMALE WITH 2 JUV. JUST ABOVE GROUSE CREEK.

Ecomonitoring Visits

Reference: EM.USMTHP * 28 * 5

Survey site: VERMILION RIVER

Start date: 1993-08-01

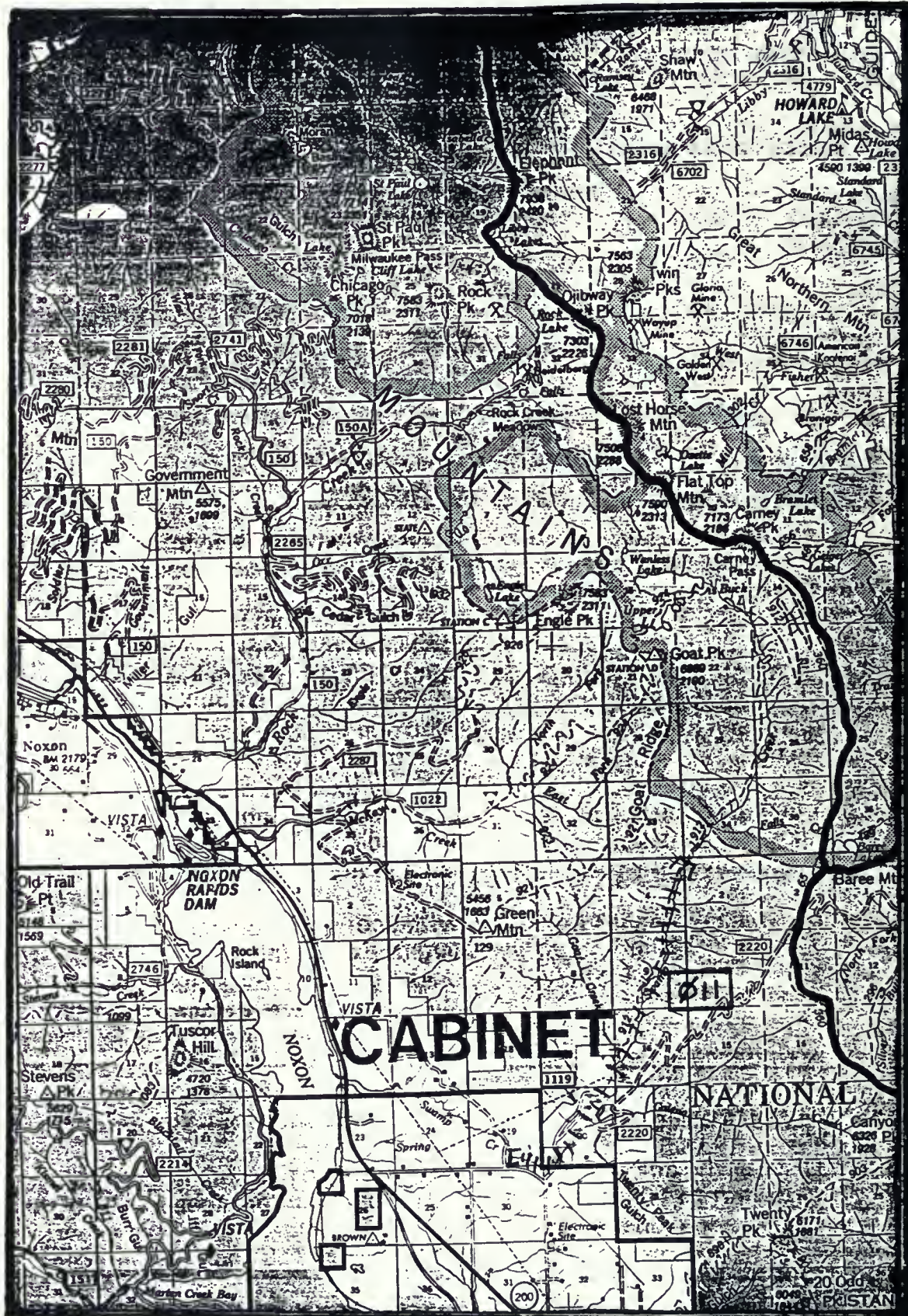
Observer: BECKSTROM

Person hours: 3.00

Effort: WILLOW CREEK TO MILLER CREEK.

Parameter:	Quantitative summary:	Quality note:
SINGLE MALES	0	
SINGLE FEMALES	0	
PAIRS	0	
JUVENILES	0	
BROODS	0	

Other observations:



MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: HISTRIONICUS HISTRIONICUS
Common Name: HARLEQUIN DUCK

Global rank: G5 Forest Service status: SENSITIVE
State rank: S2B,SZN Federal Status: C2

Element occurrence code: ABNJB15010.011
Element occurrence type:

Survey site name: SWAMP CREEK
EO rank: D
EO rank comments: 1-2 PAIRS PRESENT. 3-4 OTHER STREAMS WITHIN 20 KM
WITH TOTAL OF 9-12 PAIRS; NO BOATING, LITTLE
FISHING; DIFFICULT ACCESS.

County: SANDERS
USGS quadrangle: GOAT PEAK
NOXON RAPIDS DAM
Township: Range: Section: TRS comments:
025N 031W 16 W2; 4,9,17,19,20
Precision: M
Survey date: Elevation: 2700 -
First observation: 1989 Slope/aspect:
Last observation: 1993-08-02 Size (acres): 0

Location:
FROM SR 200 JUST NORTH OF CABINET RANGER STATION, TAKE COUNTY ROAD AND
FS ROAD #1119 NORTH TO SWAMP CREEK TRAILHEAD; THEN WALK UPSTREAM CA.
0.5 MILE.

Element occurrence data:
SPORADIC SIGHTINGS SINCE 1989; PROBABLY 1 OR 2 BROODS GENERALLY
PRODUCED EACH YEAR. (SPECIFIC OBSERVATION DATA ON FILE AT MTNHP.)

General site description:
STREAM REACH WITH NESTING/REARING HABITAT; EXTENDS CA. 4 MILES
UPSTREAM FROM LOCATION MAPPED.

Land owner/manager:
KOOTENAI NATIONAL FOREST, CABINET RANGER DISTRICT

Comments:
NONE.

Information source: MILLER, V. E. 1989. FIELD SURVEY REPORT, HARLEQUIN
DUCK (HISTRIONICUS HISTRIONICUS): LOWER CLARK FORK
RIVER DRAINAGE, WEST-CENTRAL MONTANA. UNPUBLISHED.
47 PP.

EcoMonitoring

Name: HISTRIONICUS HISTRIONICUS
Common name: HARLEQUIN DUCK

Reference code: EM.USMTHP * 1 Survey site: SWAMP CREEK

Goals & Objectives:

Management plan: Monitoring plan: Monitoring level:

Management goals:

Monitoring goals: TRACK CHANGES IN THE POPULATION AND REPRODUCTIVE SUCCESS;
DETERMINE SITE FIDELITY.

Parameter: Threshold note:

SINGLE MALES	1
SINGLE FEMALES	1
PAIRS	1
JUVENILES	1
BROODS	0

Methods: VISUAL SURVEYS, WALKING LENGTH OF EO UPSTREAM (IF POSSIBLE).

Sampling frequency: MINIMUM TWICE PER YEAR, CA. MAY & JULY/AUGUST.

Visit dates: 1993-05-11
1993-07-30

Coordinator: REICHEL, JIM

Trends & Recommendations:

Short-term trend: UNKNOWN

Long-term trend: UNKNOWN

Interpretation:

Current condition: UNKNOWN

Comments:

Management recommendations:

Monitoring recommendations:

Ecomonitoring Visits

Reference: EM.USMTHP * 1 * 1

Survey site: SWAMP CREEK

Start date: 1993-05-11

Observer: REICHEL
CASTREN

Person hours: 8.00

Effort: HWY 200 TO WILDERNESS BOUNDARY.

Parameter:	Quantitative summary:
SINGLE MALES	0
SINGLE FEMALES	0
PAIRS	1
JUVENILES	
BROODS	

Quality note:

T26,R31,S19 SE4SE4 LOCATION

Other observations:

Ecomonitoring Visits

Reference: EM.USMTHP * 1 * 2

Survey site: SWAMP CREEK

Start date: 1993-07-30

Observer: REICHEL
BECKSTROM

Person hours: 14.00

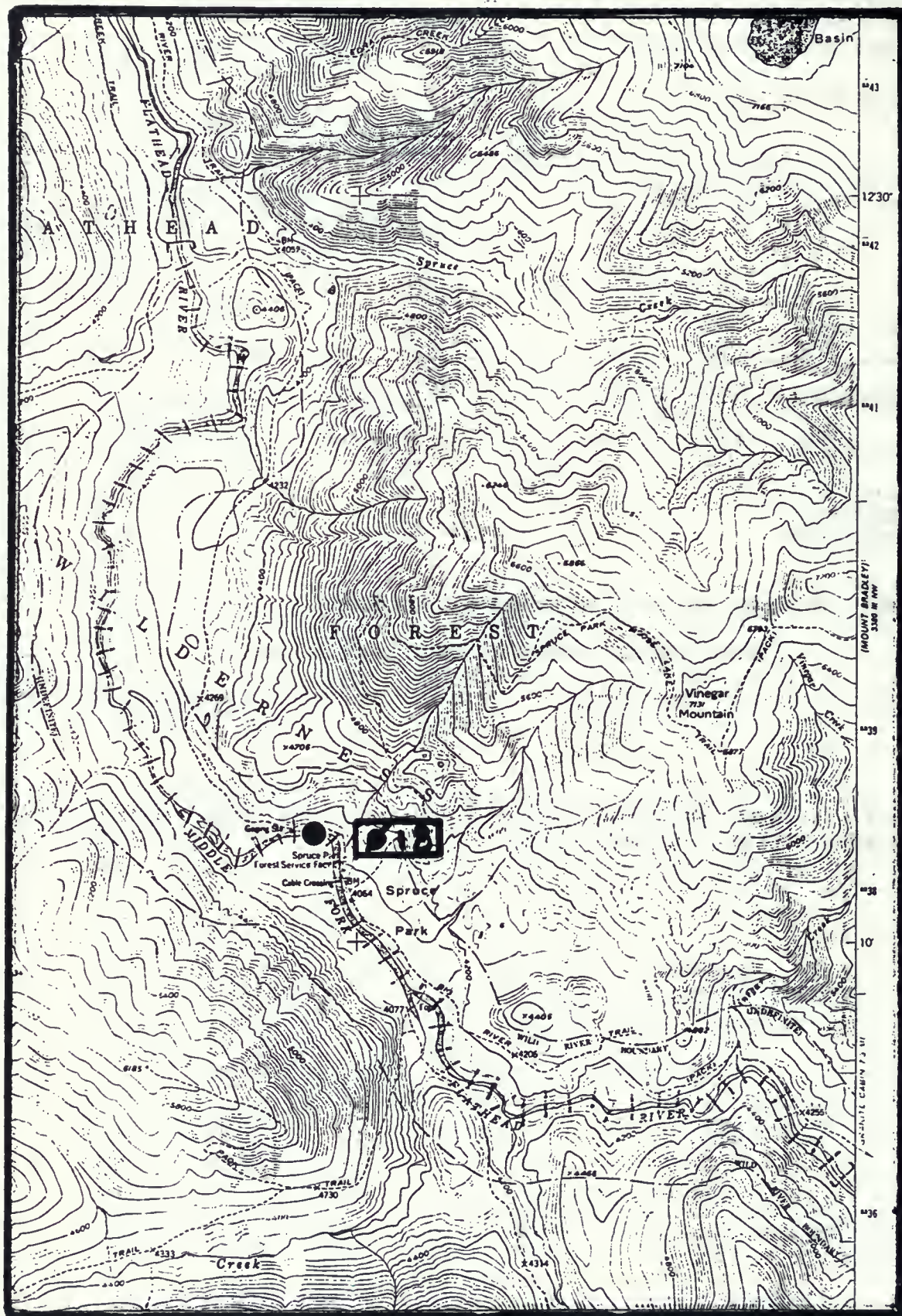
Effort: CENTER SEC.20 UP TO ABOVE WILDERNESS BOUNDARY.

Parameter:	Quantitative summary:
SINGLE MALES	0
SINGLE FEMALES	1, BANDED
PAIRS	0
JUVENILES	1, BANDED
BROODS	1

Quality note:

SEC.9 JUST BELOW SEC.4 LOCATION

Other observations: HEN PREVIOUSLY BANDED (8/92) ON MARTEN CREEK. JUV. BANDED 7/30/93; THEN SEEN 8/2/93 CA. 1 MI FURTHER UPSTREAM.



MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: HISTRIONICUS HISTRIONICUS
Common Name: HARLEQUIN DUCK

Global rank: G5 Forest Service status: SENSITIVE
State rank: S2B,SZN Federal Status: C2

Element occurrence code: ABNJB15010.018
Element occurrence type:

Survey site name: MIDDLE FORK FLATHEAD RIVER
EO rank:
EO rank comments:

County: FLATHEAD

USGS quadrangle: NIMROD

Township: Range: Section: TRS comments:
028N 015W 19

Precision: M
Survey date: Elevation: 4050 -
First observation: 1990 Slope/aspect:
Last observation: 1993-08-02 Size (acres):

Location:
ALONG THE MIDDLE FORK FLATHEAD RIVER, CA. 5 MILES BY TRAIL UPSTREAM
(SOUTH) OF US 2.

Element occurrence data:
PROBABLY 1 TO 4 BROODS PRODUCED IN A CA. 5 MILE SECTION AROUND SPRUCE
PARK. (SPECIFIC OBSERVATION DATA ON FILE AT MTNHP.)

General site description:

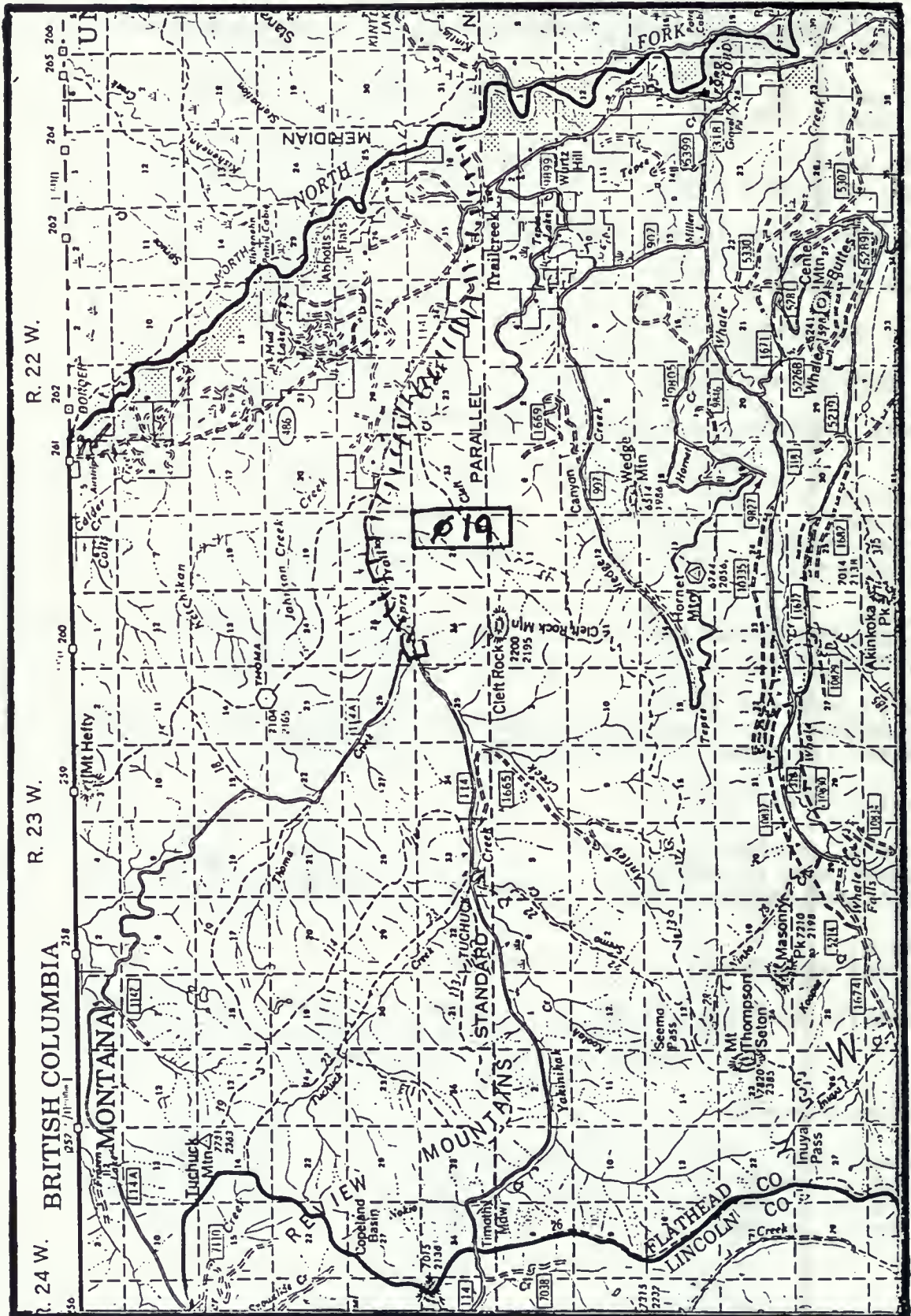
Land owner/manager:
GREAT BEAR WILDERNESS
FLATHEAD NATIONAL FOREST, HUNGRY HORSE RANGER DISTRICT

Comments:
1992 SIGHTING BY SARAH SIGLER (USFS).

Information source: CARLSON, J. C. 1990. RESULTS OF 1990 SURVEYS FOR
HARLEQUIN DUCKS ON THE FLATHEAD NATIONAL FOREST,
MONTANA. [UNPUBLISHED REPORT]. 31 PP.

Observation summary:

Observer/date	Location:	Observation:
1993-08-01, CASTREN	T28N,R15W,S28	HEN + 3 JUV
1993-08-02, CASTREN	T28N,R15W,S30	HEN + 1 JUV
1993-08-02, CASTREN	T28N,R15W,S19	HEN + 4 JUV



EcoMonitoring

Name: HISTRIONICUS HISTRIONICUS
Common name: HARLEQUIN DUCK

Reference code: EM.USMTHP * 2 Survey site: TRAIL CREEK

Goals & Objectives:

Management plan: Monitoring plan: Monitoring level:
Management goals:

Monitoring goals: TRACK CHANGES IN THE POPULATION AND REPRODUCTIVE SUCCESS;
DETERMINE SITE FIDELITY.

Parameter:	Threshold note:
SINGLE MALES	1
SINGLE FEMALES	1
PAIRS	1
JUVENILES	1
BROODS	0

Methods: VISUAL SURVEYS, WALKING LENGTH OF EO UPSTREAM (IF POSSIBLE).

Sampling frequency: MINIMUM TWICE PER YEAR, CA. MAY & JULY/AUGUST.

Visit dates: 1993-05-08
1993-08-13

Coordinator: REICHEL, JIM

Trends & Recommendations:

Short-term trend: UNKNOWN Long-term trend: UNKNOWN
Interpretation:

Current condition: UNKNOWN
Comments:

Management recommendations:

Monitoring recommendations:

Ecomonitoring Visits

Reference: EM.USMTHP * 2 * 1

Survey site: TRAIL CREEK

Start date: 1993-05-08

Observer: CASTREN
REICHEL

Person hours: 14.00

Effort: SURVEYED SEC.30 DOWN TO SEC.34. BOATED CREEK ON 8TH, BOATED
& MARKED DUCKS ON 9TH.

Parameter:	Quantitative summary:	Quality note:
SINGLE MALES	3, 1 BANDED	SEC.30
SINGLE FEMALES	0	
PAIRS	6, 2 PAIRS BANDED	
JUVENILES	0	
BROODS	0	

Other observations: ONE PAIR & ONE FEMALE PREVIOUSLY (1992?) MARKED. DUCKS
FOUND FROM CENTER SEC. 30 TO SEC. 33-34 LINE.

Ecomonitoring Visits

Reference: EM.USMTHP * 2 * 2

Survey site: TRAIL CREEK

Start date: 1993-08-13

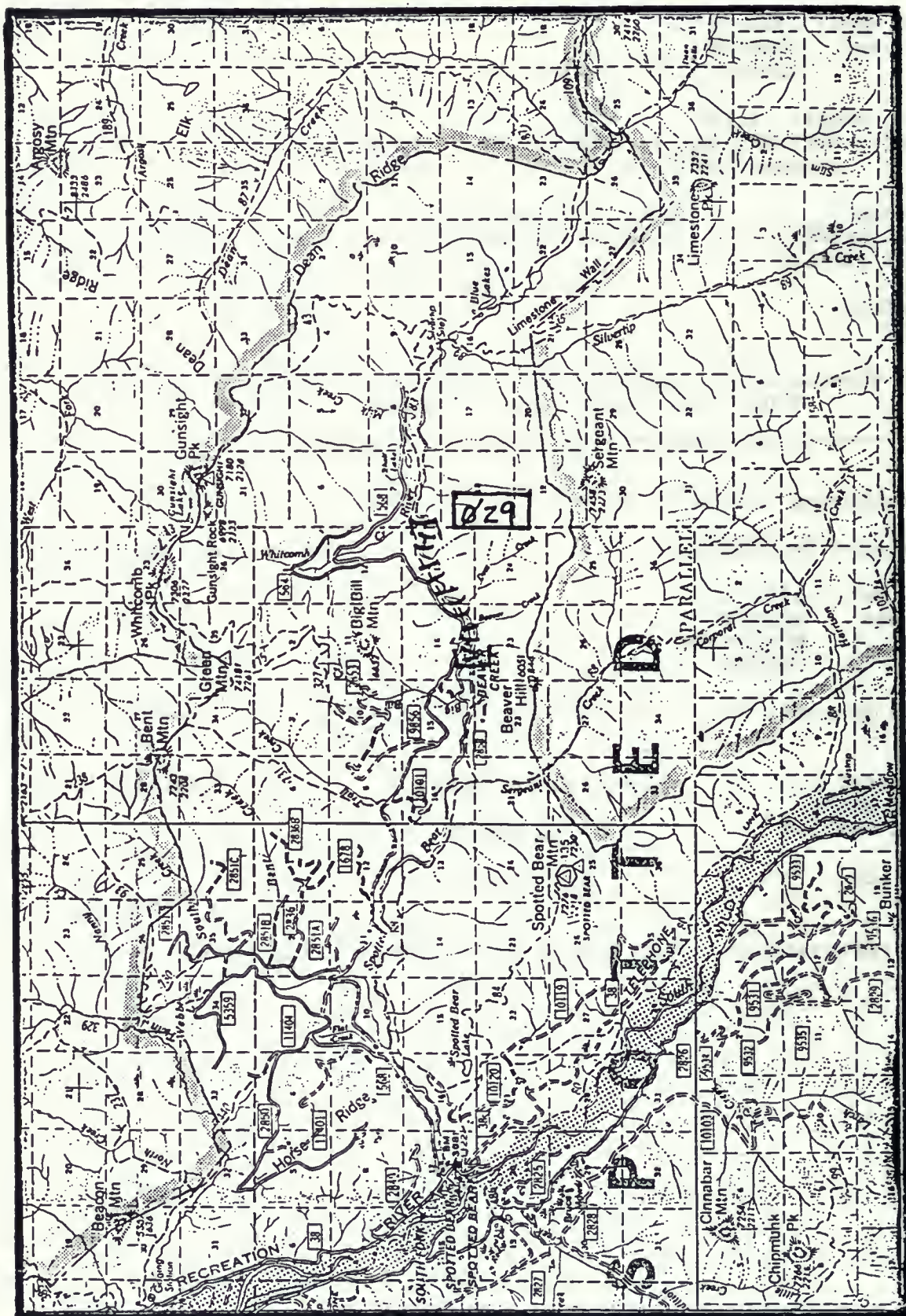
Observer: REICHEL
BECKSTROM
CASTREN

Person hours: 7.00

Effort:

Parameter:	Quantitative summary:	Quality note:
SINGLE MALES	0	
SINGLE FEMALES	2, 2 BANDED	
PAIRS	0	
JUVENILES	8, 7 BANDED	
BROODS	2	

Other observations: BOTH BROODS IN ONE GROUP; LOCATION NOT INDICATED.



MONTANA NATURAL HERITAGE PROGRAM
Element Occurrence Record

Scientific Name: HISTRIONICUS HISTRIONICUS

Common Name: HARLEQUIN DUCK

Global rank: G5

Forest Service status: SENSITIVE

State rank: S2B,SZN

Federal Status: C2

Element occurrence code: ABNJB15010.029

Element occurrence type:

Survey site name: SPOTTED BEAR RIVER

EO rank: D

EO rank comments: NO RECORDS OF MORE THAN 2 PAIRS PRESENT. SOME
FISHING AND BOATING. RELATIVELY EASY ACCESS AFTER
THE ROAD OPENS (USUALLY AFTER JULY 1). MAY BE PART
OF A LARGER SOUTH FORK FLATHEAD RIVER EO.

County: FLATHEAD

USGS quadrangle: WHITCOMB PEAK

Township:	Range:	Section:	TRS comments:
025N	014W	14	13

Precision: M

Survey date:

Elevation: 4050 - 4200

First observation: 1992-08-13

Slope/aspect: -/-

Last observation: 1993-08-15

Size (acres):

Location:

FROM HUNGRY HORSE, GO UP EAST SIDE OF RESERVOIR TO SPOTTED BEAR RIVER
(CA. 50 MILES), THEN UP SPOTTED BEAR RIVER TO BEAVER CREEK CAMPGROUND.

Element occurrence data:

PROBABLY 1 OR 2 BROODS PRODUCED EACH YEAR. (SPECIFIC OBSERVATION DATA
ON FILE AT MTNHP.)

General site description:

STREAM REACH OF CA. 2 MILES.

Land owner/manager:

FLATHEAD NATIONAL FOREST, SPOTTED BEAR RANGER DISTRICT

Comments:

EXTENT OF OCCUPIED BREEDING HABITAT UNKNOWN. NOTE REPORT OF SINGLE
FEMALE AT DEAN FALLS, CA. 10 MILES UPSTREAM OF WHITCOMB CREEK, ON 8/4/93.

Information source: GENTER, D. L. 1992. [FIELD NOTES FROM 13 AUGUST
RE: BANDING HARLEQUIN DUCKS ON SPOTTED BEAR
RIVER.]

